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CONTRIBUTIONS.—Subscribers and others will materially assist in making our news accurate and complete if they will send early information of events which take place under their observation. Discussions of subjects pertaining to all departments of railroad business by men practically acquainted with them are especially desired.

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FRIDAY, NOVEMBER 1, 1907.

The New York, New Haven & Hartford has dismissed between 2,500 and 3,000 men, most of them working hitherto on its improvements. This is a direct result of the financial stress and the necessity of providing for the cash payments of the future. The incident has its quick and sharp lesson for labor and is not limited to this particular case. The New Haven had a large amount of cash on hand. It expected to go on with its improvements. It wanted these improvements finished as soon as possible, and partly relied on them as a basis for increased future earning power. But in spite of these favoring conditions the sudden intensifying of the general financial trouble forced a change of policy. And the labor force of the corporation felt instantly the strain on capital. It illustrates a broader truth, prosaic but powerful. Capital is at one end of a rope, labor at the other. Capital is jarred and the rope begins a series of wave movements. They may be rapid, they may be slow, they may be long, they may be short; but, in all cases, they reach the whole length of the line from capital to labor. And when tight money, tight capital and tight credit, albeit somewhat identical terms, unite in a convulsion, the man at the shovel and tamping bar feels an impact like that felt by the man in Wall street. The truism has had many and familiar examples; but not often has it been shown up so suddenly, so uniquely, so quickly and on such a scale as in the New Haven case, where the wage earner's prosperity abruptly shifts to adversity. The political workers in our legislatures, more versed in railroad baiting than in handling the pick, have opportunity to take notice and warning. A great political campaign is set down on the calendar for next year. The enthusiasms of full-dinner-pail constituents are the extreme reverse of the complaints of men with empty dinner pails. "You have hurt the railroads, but what have you done to us?" The men at the other end of the rope already know what has been done to them.

The standards for parts of electric motor trucks, which were recently adopted by the American Street and Interurban Railway Engineering Association, are shown in another column in this issue. They represent the first serious attempt to bring about some uniformity in electric truck building and, no doubt, are only a fore-

runner of future work toward standardization in other details of street and interurban car construction which will be no less far reaching and important than the last 30 years' work of the Master Car Builders' Association. Present practice in electric car and truck building is a curious mixture of the old ideas handed down from the days of horse cars and of many details of steam railroad car construction. Variety and individuality have marked the development, with the result that on the same road or system of roads many widely different patterns of trucks and truck details are in use. This works a hardship alike on the manufacturer of equipment and the officers and men in charge of the repair and maintenance of the cars. Of course, such a situation is not so bad on most electric roads as it would be on steam roads because as yet there is no general interchange of equipment. The value of standardization, however, is now well known to those steam roads which, in the last few years, have systematically carried out the idea in every possible detail of car and locomotive building. The individual electric roads will find it no less valuable in reducing the cost and time of making repairs and promoting generally a higher standard of maintenance.

The standards adopted by the Association include axles, journal bearings and boxes, brake-shoes and wheel contours. These are the essential elements of the running gear. Axles are perhaps the most important, since the dimensions of wheels, journal bearings and the motor attachments depend on the size and shape of the axle with which they are used. The general design of the six standard axles adopted is similar to the M. C. B. standards in respect to size of journals and capacity, the sizes ranging from $3\frac{3}{4}$ in. x 7 in. to $5\frac{1}{2}$ in. x 10 in., with capacities from 15,000 lbs. to 38,000 lbs. The diameter of the wheel fit has been enlarged, somewhat, because the axles are used for driving; and the center portion between gear fits is made of uniform diameter without taper towards the center. In the five largest axles the diameter is made larger than that of the three corresponding M. C. B. axles to provide for the additional stresses imposed by the weight of the motor and the torsion of driving. The journal bearings and boxes are substantially M. C. B. standard with alternative designs of boxes to be used with trucks having springs over the journals. More confusion existed in the

matter of brake heads and shoes than in any other detail considered by the committee and the two designs adopted are radical departures from the present practice on many roads. M. C. B. standards were here again used as a working basis and the design of head and shoe for wide tread wheels (3-in. and over) are both interchangeable with the Christie head and shoe. For wheels with treads narrower than 3-in., a modified Christie head and shoe were adopted. It was found to be impracticable to design a single head which would take shoes varying from 2½-in. to 4-in. tread, and these are the wide variations which are found in practice. Two designs of wheel treads were adopted, both differing widely from the M. C. B. standard, which is recognized in the report of the committee but not shown as a third alternative although it is in increasing use on heavy interurban roads which have entrances into cities over private right-of-way. The light wheel has a tread only 2½ in. wide and a flange 1⅞ in. thick and ¾ in. deep. The existing franchises in some cities, particularly in the New England states, prevent the use of tracks and special work suitable for wheels of wider tread and deeper flange and the design adopted is an undesirable makeshift to provide for conditions which cannot at present be changed. The heavy design A is intended for combined city and interurban work and has been found in service to give the required safety for any but the highest speeds and at the same time to run over all modern special work without damage. The deeper flange is no wider than in the light wheel and can be run on either grooved or girder rail. The wide tread materially reduces the wear on the surface of special work. In conclusion it may be said that these standards are not experimental, having all been tried in the most severe service, and that they meet with the unanimous approval of all the manufacturers.

GEORGE WESTINGHOUSE.

For a second time in a crisis this wonderful engineer appears near the center of the stage with the light turned on his financial constructions, and by the results of inspection and full knowledge these essential, but to him incidental, products of his genius must stand. Some things are certain in this uncertain world, and among them is the human certainty that his work will go on and will be conducted by him without other than slight check, because it is World's work, making materials which are the results of original study, invention and adaptation for the most part having to do with the arts of transportation, and all for saving life and producing better implements of civilization. If there were doubt of this, if there were fear of his "going to the wall," it would be a matter of concern to every railroad officer who respects his profession and takes it seriously; and also to his business rivals, commercial enemies, who have never failed to acknowledge the indebtedness to this great inventor and producer.

There are 21 American and 10 foreign Westinghouse companies,* with 210 officers, \$120,000,000 capital, \$90,000,000 annual output, 24 factories with 7,000,000 ft. of floor space, and an army of 38,000 employees. And these huge machines are not simply notable because they make most of the automatic brakes and a fair share of the signals, draft gear and electric light, power and traction materials for the civilized world. Their beneficent power and influence is due rather to the original investigation, invention and design and development which have been an incentive and a spur to other engineers and manufacturers.

So swift a pace was never before known as that set for getting

*The principal American companies are: American Brake Co., Atha Steel Casting Co., Bryant Electric Co., Canadian Westinghouse Co., Cooper-Hewitt Electric Co., East Pittsburgh Improvement Co., Nernst Lamp Co., R. D. Nuttall Co., Perkins Electric Switch Mfg. Co., Pittsburgh Meter Co., Security Investment Co., Union Switch & Signal Co., Westinghouse Air-Brake Co., Westinghouse Automatic Air & Steam Coupler Co., Westinghouse, Church, Kerr & Co., Westinghouse Electric & Mfg. Co., Westinghouse Foundry Co., Westinghouse Inter-Works Railway Co., Westinghouse Lamp Co., Westinghouse Machine Co., Westinghouse Traction Brake Co.

The principal European companies are: The British Westinghouse Electric & Mfg. Co., Ltd.; Societe Anonyme Westinghouse, La Havre, France; Societe Electrique Westinghouse De Russie; Traction & Power Securities Co., London; Westinghouse, Cooper, Hewitt Co., Ltd., London; Westinghouse Electricitats-Aktiengesellschaft; Westinghouse Metal Filament Lamp Co., Ltd., London; Westinghouse Metallfaden-Gluchlampen fabrik Gesellschaft m. b. H.; Westinghouse Brake Co., Ltd.; Compagnia Italiana Westinghouse Die Freni.

Some idea of the scope of the several manufacturing companies can be got from a brief list of their more important products: Electric apparatus of all kinds. Train brakes. Locomotive brakes. Electric-car brakes. Automatic slack adjusters. Automatic air and steam couplers. Friction draft gear. Automatic and manual block signals. Hand-operated and power-operated interlocking machines. Gas producers. Gas and water meters. Steam and gas engines. Turbines. Mechanical stokers. Air compressors. For installation and construction work, one of the larger corporations is occupied exclusively as designing and constructing engineers. For example, the company had charge of the layout and construction of the Boston South Terminal and now has the mechanical and electrical engineering and equipment of the Pennsylvania's New York terminal, involving an expenditure of \$25,000,000.

full knowledge of how to control electric force for the uses of mankind; and few indeed of the great men who have made their mark in this field fail to credit that pace to Mr. Westinghouse. Probably the greatest single thing in this way which he has done was in introducing and developing in America the use of the alternating current for transmitting and applying electricity. He was one of the first to see the possibilities of the applications of the alternating current, and with his characteristic courage and vigor he proceeded to buy patents, to invent, to develop apparatus and methods and to push forward commercially along that line. He had a tremendous fight against established interests, but he has revolutionized practice, and the theories he sustained with such vigor and at such expense in money and personal comfort, are now accepted by the electrical engineers of the world.

He has sole credit for originating a method of stopping trains and controlling speed so as to make high speed and heavy train movement possible, and with the help of his staff he has been able during the past 38 years to successively improve and adapt that method to all new conditions. In doing this he has saved thousands of lives, directly in the actual train service, and indirectly, to a degree not measurable, in the resultant quick transportation of food, materials and people.

What may be called his second important series of studies for securing safety and increasing the capacity of railroads was to the same end of preventing collisions and permitting increased density of traffic. In invention and development of automatic block signaling and power interlocking he was one of the pioneers, and in results undoubtedly the most important of all of them. Our readers are fairly familiar with his work in these lines. They can, however, have no conception of the tenacity of purpose and the prodigal expenditure of mental energy that have gone to develop the special arts and apparatus which are the reason for existence of the Air Brake Co. and the Union Switch & Signal Company.

In the same line of thought he began more than 20 years ago studies and experiments in draft gear for the purpose of making it possible to haul long trains of heavily loaded cars, reducing the shocks and preventing the disastrous breakaways. Early failures in his friction draft gear meant nothing to him. He is classed as one of those who have "the courage of their convictions," but this is not accurately descriptive. His belief becomes his principle, and when he believes he acts on it with no thought of the quality of courage and no need to muster it. To him the success of the friction draft gear and its useful function were foreordained.

The briefest enumeration of the ways in which Mr. Westinghouse has made high speed, heavy trains and more frequent trains possible and safe sounds like a eulogy, but there is no intention of that sort in this writing. It is, rather, to remind every railroad officer who honors his calling that this man who has done so much for us is facing a financial storm with the same quiet confidence that he has shown with hundreds of mechanical difficulties, and that he deserves to have the support of railroad officers, engineers and business rivals. He is capable of great work in this world for many years to come, and we must not lose the benefit of that work.

One contribution made by Mr. Westinghouse to the welfare of mankind is not known by many people outside of a limited district. He was a pioneer in the development of the method of using natural gas as a fuel. When he took up the matter its use was quite limited and was crude, wasteful and dangerous. He saw the methods of transportation in handling gas must be revolutionized before it could be successfully used in a large and general way, and to his engineering sense is due the development of the successful method of transmitting gas in large volumes at low velocity and under low pressure.

At this time, in addition to an enumeration of his work, something about Mr. Westinghouse's personal characteristics may aid the younger generation to understand the situation. He is a man of great physical strength, he has lived an abstemious and sober life. He has never smoked a whiff, he never drinks anything but possibly a glass of wine with his dinner. He has always eaten sparingly and carefully and, while he has worked tremendously, his work has been widely varied and a succession of mental diversions, a substitute for amusements in keeping mind and body stimulated and elastic. Physically he seems as young as an ordinary business man of 45 or 50, and he has a reasonable expectation of 20 years of valuable work, although he was born in 1846.

Intellectually, he was probably never more powerful than he is to-day. It is to be supposed that the imaginative side of his mind is less vigorous now than it was twenty years ago, although that is by no means certain, because he is a man so phenomenal in

make-up. In capacity for sustained attention, in power of analysis and reason, and in command of a vast store of experience, he is probably to-day a better man than he ever was before. All of this being so, it is impossible for those who know him to think of him as relaxing his efforts or suffering any diminution of power or control.

It would be quite impossible to even attempt to give any notion of the multitudinous interests into which his restless mind has penetrated, always with the aim of producing practical and useful results. For while he is a man of imagination and of visions, the governor of his mind is always set to the end of utility.

Why has he done this? Why has he set aside ease and pleasure? Why has he given his years to unceasing toil? Why has he repeatedly ventured fortunes in great enterprises? He might have retired at 40, a very rich man with a name known and honored all over the civilized world, with a great capacity for enjoyment and with abundant means to gratify all the tastes and desires of his enterprising and versatile spirit. Probably Mr. Westinghouse himself could not answer these questions. He has worked as all great men have worked—in obedience to an internal, compelling force. It is certain that the desire to amass and leave behind him a colossal fortune has been the most insignificant element in the forces that have driven him forward. It is certain, also, that he has always felt a noble aspiration to do good in the world, to really serve mankind. Unquestionably, he loves power and responsibility. Unquestionably, too, he is keenly alive to the good opinion and the approbation of the best minds. But it is very doubtful if these recognized incentives to exertion and to self-sacrifice have been other than contributory to the main result. Behind it all lies that mysterious, impelling force (the definition or analysis of which is perhaps impossible) which pushes men forward as fast and as far as their powers permit them to go. The directions which they take, the results which they achieve, depend upon the qualities of their minds and on their moral natures; and these we can discern and analyze, but the driving power behind is often beyond our comprehension.

The sources of his power over men are perhaps easier to discern than are the underlying motives of his conduct. Men feel immediately the dominating force of his will. They recognize at once when they come in contact with him the breadth and power of his intellect. And then, as they go on, they discover his generosity, his magnanimity, the loftiness and purity of his motives, and they are attracted by the simplicity of his manners. People often say that he has great personal magnetism. So he has—whatever that may mean. But, after all, that is merely an easy phrase in which to sum up the resultant of the noble qualities of his mind and character.

THE NEW PSYCHOLOGY OF RAILROAD INVESTMENT.

As distinguished sharply from "high" financiers and minor groups of speculators who have their daily flights, high and low, in railroad securities, the real investors who buy railroad stocks to have and to hold may be roughly divided into two classes, each large. There is the ultra conservative who always writes big the word "security." His objective point is almost always the railroad bond of senior place and quality and generally the first mortgage bond, though now and then he may take a shallow dip into, what seems to him semi-speculative, the junior mortgage of a dividend-paying line. But a mortgage security on railroad property he craves and must have. The second class of investor has its special affinity for railroad stocks, dividend paying or likely to become so. The psychological influence in that class is the little touch of the gambling instinct which, to the assured and regular dividend, adds the uncertainty, tipped with hope, of larger dividends or "rights" to come. It is interesting to trace in the case of both these large groups of investors some of the changes of mental action and reaction which the remarkable drop in railroad values of the last two years has brought about.

Take first the ultra conservative or mortgage seeker in railroad investment who was content with his 3.75 per cent. return two years ago. Since then he has had no diminution of income nor, on the other hand, has he had an increase. His double gilt edged bonds have not defaulted nor are they likely to unless the heavens fall. But he has seen the purchasing power of his well-secured income diminish probably 10 per cent. in two years; and, what is more puzzling to him, not to say disquieting, he has seen the market appraisal of his solid security shrink 5, 10, 15 per cent., sometimes more. It is, in its outward phases, as though the holder of a time

mortgage, secured by triple value of realty, were to be told that its assignment value were below par—as indeed is true nowadays in some cases. What wonder that, under such conditions, the conservative old investor in railroads moving in his narrow fiscal groove, finds his old standards confused, and, if he be not endowed with broad knowledge and instincts, finds also his timidities increased. Nor, safe as he may be in fact, is he exempt from the revelations of official turpitude which seem to him a present fact and liable to be a future one though in reality they have in nearly all cases been the transactions of the past the exposure of which now is the prime medicament in the cure. In the secondary causes of the existing stress in railroad loans this new psychological condition of fear, sometimes definite, more often vague, may be counted among the first. Nor is the bondholder comforted much or his fears allayed by his opportunity to secure on the senior railroad mortgage a three-quarter per cent. added interest return, if he happens to have funds to reinvest. It rather accentuates his discomfort over the low return on the "long" bonds which he bought with such placid assurance two years ago.

The investor in conservative railroad stocks has also had his mutations, mental and sentimental. Some of his standards likewise seem lost or perverted. His values have contracted, not so much in ratio to be sure as speculative shares, but to an absolute amount much greater and which often signifies greater loss; but meanwhile dividends in the case of some great lines have been increased, non-dividend roads have begun to pay dividends and income has gained. Along with this anomaly have gone others. The new stock which used to be watched for by him with hope is now a thing of dread. It used to "bull" a stock—now it "bears" it; and the certainty of its outcoming depresses usually shares below the mathematical point normally fixed by ratios of issue and the original price. He, too, thus falls into mental confusion and uncertainty. The old Latin maxim, "everything that is unknown is magnified," applies as much to railroad investment as to the general affairs of the world at large. Under the old psychology of railroad investment plus force of habit the investor who "never sold" and always "held on" and whose conservatism was such that he was even apt to decry the quoted value of his railroad securities is generally holding on still. But he is not holding on with quite the old confidence, nor, on the other hand, is he crying down now his investments. His mental attitude is mainly one of perplexity, the results of which in so large an investment class one dislikes to think of should ever dividends as well as principal be reduced.

The "locality" idea as a mental factor in railroad investment is another psychological force which has undergone a change. Up to two years ago there was a proneness on the part of the old-fashioned investor to put his money into the securities of the local line whether it was a small line or part of a great system—this under the theory, not always sustained by facts, that the security could then "be watched." It was this *motif* which has gone so far in building up localized street railways by enabling their owners to place underlying bonds. Those bonds, like all others, have shrunk to near a 5 per cent. basis. Partly owing to that fact, partly because large issues of "localized" securities have overloaded local holders there is now a distinct drift away from the "local" idea which, incidentally, has been farther warped by the magnetism of Wall street bargains in such forms, for example, as the best railroad notes. When the present anomalous condition of financial affairs, with tight capital rather than tight money as its basic cause, comes to an end it will be instructive to see how far that local investment motive resumes its sway. It is but one of the many problems of the new railroad investment psychology the solution of which challenges the curiosity of economist and philosopher.

Finally, if we turn to the immediate present and to the existing parlous and convulsive state of the investment market, we find the old-time railroad investor the mark of some novel mental forces. He sees yet another shrinkage of his standard railroad shares to a 6 per cent. basis or below, credit depressed while railroad traffic is high, and almost imperative railroad extension and improvements halted by semi-panic prices of railroad loans. But he has also his visions of reassurance. He notes the power of organized capital to resist deadly financial convulsion; the relative strength of the high grade railroad security as compared with many other forms of investment; and last but not most impressive, the way in which low finance is asserting itself against high finance, and old-fashioned conservatism proving its merits over new fashioned speculation. But in that there is nothing new, psychologically or otherwise.

Southern Railway.

"The conditions of operation during the past year have been extraordinary. Great as are the burdens upon the operation of a railroad to-day by reason of the increased cost of material of all classes and the unabating expectations of labor, on the one hand, and legislative reduction of revenue and increased taxes, on the other hand, the crying need of the railroads of the South is more track, more equipment, more terminal facilities. With the strategic position and established relations which the Southern Railway now has, there would be no stint in the amount of traffic it could obtain and profitably handle if it had the facilities necessary to afford to those who offer traffic, the service they demand. During the past winter there were serious congestions of freight on the lines of this company, which were due, almost without exception, to the failure of the plant to respond to demands which were made upon it beyond its capacity. While exasperating the public, congestion rolls up the expense of operation, and both shipper and carrier suffer.

"Apart from congestion of traffic, the expenses of operation, of which mention has been made, have been extraordinary. To illustrate: during this fiscal year the rates of pay of machinists, boiler-makers, blacksmiths, tanners and pipemen, car-men, engineers, firemen, conductors, trainmen, operators and maintenance of way employees were substantially increased, this increase approximating \$1,250,000 per annum; while the greater price at the mines, together with freight charges paid for coal purchased for the Virginia and North Carolina lines from mines on other railroads, added nearly \$250,000 to the cost of fuel in the same period. If comparisons are made with the costs of material and labor several years ago, the present burden is still more apparent. Since 1898, the cost of bridge timber has increased from \$9.36 to \$23.59 per thousand feet; cross-ties from 28 cents to 37.6 cents per tie; steel rails from \$17.75 per ton to \$29 per ton; fuel coal from 89 cents to \$1.37 per ton; the cost of labor, per mile of road, has increased from \$1,621.67 in 1895 to \$2,513.64 in 1905, with a further advance to \$3,189.11 in 1907."

Thus does President Finley sum up the causes which have brought the Southern Railway in one year from a condition of abounding prosperity, with great hopes for the immediate future, to a point where it is for the moment hard pressed on every hand. Extraordinary is a fair word to use to describe the operating conditions of the year.

The income account strikingly shows the company's changed position. Gross earnings increased \$3,000,000, or 6 per cent., over 1906, but operating expenses were \$4,700,000 larger, leaving net earnings smaller by \$1,700,000. There was an increase of \$1,600,000 in fixed charges which, added to the decrease in net earnings, caused a falling off of \$2,900,000 in net income, a decrease of 56 per cent. Net income was \$2,300,000, against \$5,200,000 in 1906.

Two semi-annual dividends of 2½ per cent. each on the preferred stock were charged to income in the previous year. In April, 1907, the regular semi-annual dividend of \$1,500,000 was paid out of the income of the year. This year's October dividend, however, was only 1½ per cent., calling for \$900,000, and instead of being charged to the income account, as the October, 1906, dividend had been, was charged to profit and loss. With even this smaller distribution charged to the year's income, there was a deficit for the year of \$646,000 instead of a surplus of \$240,000, according to the company's showing.

Moreover, if the same dividends had been paid out of income and the same amount appropriated for improvements in 1907 as in 1906, the year's deficit would have been over \$1,700,000, against a surplus in 1906 of \$1,200,000. This is a remarkable change for the worse within a twelvemonth. As its further result, there was a decrease during the year of over \$2,000,000 in the Southern's total profit and loss credit balance.

Yet in the following statement, President Finley shows the reasons why the future of the property, in spite of last year's bad record, should be bright and prosperous:

"The remarkable growth of diversified industry in the South in recent years, particularly along the Southern Railway lines, has created an internal traffic largely local as to its origin but covering a wide field in its distribution. This has given the company a sound basis of independent operation and a commanding position in its negotiation for traffic from outer sources. The extent and diversity of this commercial expansion and its beneficial effect on the interests of the company can only be fully appreciated by close and careful analyses. The main facts are that the South now melts more than half the pig iron and converts into cloth and garment more than one-fifth the cotton which it produces. Its phosphate beds have formed the basis for the manufacture of commercial fertilizer on such a scale as to make the South independent of outside sources of supply and to add greatly to her agricultural productiveness. The manufacture of furniture has grown to such proportions as are not exceeded in any other like section of the country, yet without decrease in the volume of lumber sent from the South to other markets of this country and abroad. The production of coal has, with difficulty, kept pace with the development of industry,

not because of inadequate supply, but because of restricted transportation facilities. The cultivation of fruits and vegetables has afforded a large and increasing flow of that class of traffic to the eager markets of the East and North.

"That this commercial growth will continue along healthy lines is assured by profitable operation in the past and a continuing increase in demand. That it must take place in a large measure along the lines of this company is certain, because of the abundant supplies of fuel and raw materials originating along its rails, and because of the outlet it affords to all consuming markets. The Southern is therefore assured of a continued increase in its internal traffic of both raw materials and manufactured products. A single industry, the operation of which will soon begin, will add 500,000 tons to its freight traffic and as many dollars to its annual gross revenues.

"The existing relations with connections by land and sea are most satisfactory. The conditions of interchange are such as to justify the claim for increased tonnage on reciprocal grounds. Traffic arrangements with steamship connections at Virginia, South Atlantic and Gulf ports afford the fullest opportunity for the development of the largest amounts of export, import and coastwise traffic. Through service and a complete package car system operated with chief connections and supported by efficient traffic organizations guarantee a large increase in the higher classes of traffic. Reciprocal relations with lines serving the great grain and grazing sections of the North and West have enabled the company to share in a large way in the movement of meat, grain and grain products from those sections to the South and East. The large consuming section served and the important milling interest located on the lines of this company add greatly to its strength in the control of this important traffic.

"Southern Railway lines have enjoyed and are destined to increasingly share in the extraordinary industrial opportunity which exists in the South. Those lines penetrate a territory whose resources fully justify the rapidly increasing interest manifested in its economic development and progress. The minerals, timber and soils, all important elements in the best development of the nation's wealth, are paramount in the Southern country. The promotion of their proper development has received the particular attention of this company, and the policy pursued in bringing the latent resources of the South to the attention of the world is redounding to the advantage of the railroad and the rich territory it serves. This territory is being covered with new manufacturing plants (the records show 860 new industrial enterprises completed and placed in operation during the year), while the numerous existing factories established since the organization of the company are most successful and are being generally enlarged.

"Particularly the forests of the South have attracted capital for their development. Several hundred wood-working plants alone were established in Southern Railway territory during the year. The second largest furniture industrial center in the United States (High Point, N. C.), is located on this company's tracks; along the lines of the company 27 new furniture factories began operations during the year. The manufacture of wood pulp is a recent important industry, from which an entirely new and large volume of traffic may be expected. The abundant supply of necessary raw material and cheap power is attracting to the territory capitalists interested in the manufacture of paper, a promising industry from which large traffic may be ultimately expected. It is important, however, to remember that these industries can be perpetuated only if the sources of the supplies of raw materials are preserved. The forests of the South are to-day one of its chief assets, and there is opportunity to preserve them as such for all time. While other sections, by the indiscriminate cutting of their forests, have in great measure consumed their supplies of raw material for the manufacture of lumber, and of everything in which wood is used, the South still has great areas in which the forests have been practically untouched. It is hoped that the Southern people will benefit by the mistakes of others. By the adoption of a system of intelligent forestry, the woodlands of the South may be so used as to yield a substantial immediate profit, and, at the same time, be so preserved and reproduced as to be a continuing source of wealth for future generations. The railroad companies which depend so largely upon the forests for the material they consume, not to speak of commercial traffic, are fully alive to these considerations, and this company is co-operating in all reasonable ways to preserve this important element in the inherent strength of its commercial position.

"The textile industry of the South is largely confined to the districts reached by this company's lines, and gives promise of great future growth by the erection of more mills and enlargements. During the year 48 new textile manufacturing plants were completed and placed in operation in the territory served by Southern Railway lines. The electrical power developments directly tributary to the lines, and the mining districts supplying cheap coal, make beyond all peradventure the districts served pre-eminent in the South for profitable manufacturing.

"Co-ordinate with the promotion of the industrial development.

is the practical solicitation of immigration. The general advertising by this company of the merits and possibilities of the country has proven an influential factor in introducing prospective immigrants to the possibilities of the South. A line of work has been carried on which tends to very greatly diversify the agricultural products of the territory, and to establish the value of southern lands for a widely varied husbandry. More skilled methods of agriculture are greatly increasing the amount and value of farm products, of which there is direct evidence in the substantial increase of land values throughout all the southern states."

This is a clear, full statement of the possibilities of the property in existing and potential traffic and in industrial opportunity. It is seldom that the traffic strength of a great railroad has been thus summarized to its stockholders. President Finley's plea for intelligent forestry is particularly to be commended as an example of intelligent foresight.

What the Southern Railway needs is not traffic or opportunity, but facilities, particularly in tracks and terminals. President Finley considers that the territorial relations of the road have now been established and the policy of the future should be to strengthen the established lines, on which earnings are no longer problematical. As most important, this policy requires new second track and revision of grades and curvature on the lines of heaviest traffic.

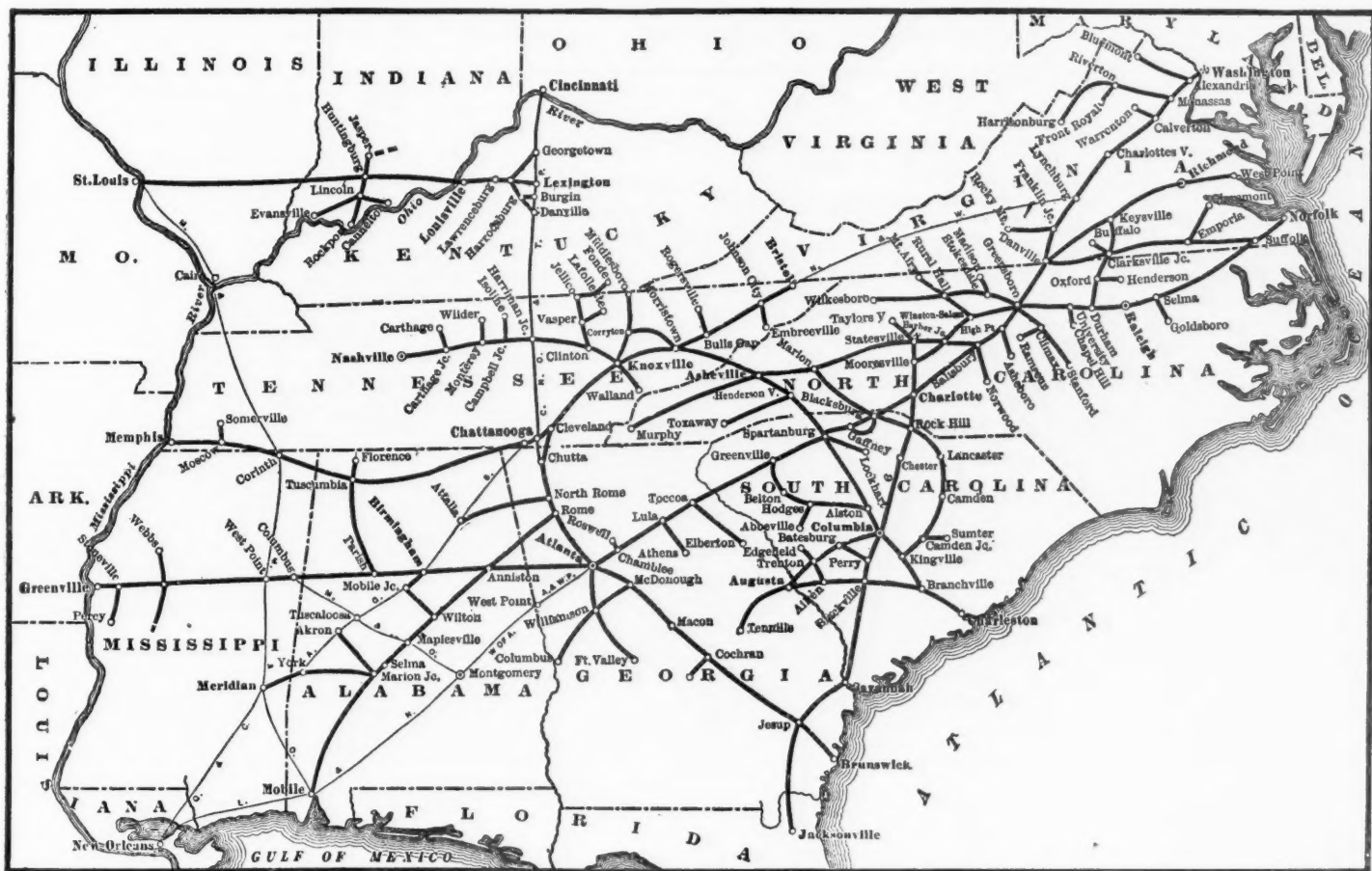
On its total mileage of over 7,500 miles the Southern Railway

the Railroad Construction column of the *Railroad Gazette* of October 18, 1907. Profiles of five of the new lines are also given in the report.

Another important department of new work is that on the union passenger stations now building in several of the most important cities of the South. These are being built by terminal companies whose obligations are guaranteed by the railroad companies which will use the stations. During the year the Southern has joined in guarantees on bonds or notes sold by the Gulf Terminal Company of Mobile, the Birmingham Terminal Company, the Charleston Union Station Company, the Meridian Terminal Company and the New Orleans Terminal Company.

Turning to the operating results, the increase in cost of conducting transportation over the 1906 year was 15 per cent. Maintenance of equipment increased 12 per cent. and maintenance of way and structures, 8 per cent. Maintenance of way cost \$1,015 per mile of line, against \$966 in 1906. There were 358 miles of track laid with new rails, against 543 miles in 1906. The tie renewals averaged 358 per mile, against 404 in 1906, the decrease largely due to the difficulty of getting ties. Repairs and renewals cost \$2,324 per locomotive against \$2,632 in 1906; \$842 per passenger car, against \$956 in 1906, each a decrease of 12 per cent., and \$74 per freight car, against \$72 in 1906, an increase of 2 per cent.

The benefits of the improvements to the line are not yet shown



Southern Railway.

had on June 30, 1907, only 207 miles of double track, although as soon as work now under construction is finished there will be 292 miles. In supplying second track the first efforts have been directed to points where two or more lines converge and heavy traffic is thrown over the road. Such gauntlets exist between Salisbury, N. C., and Greensboro; Knoxville, Tenn., and Morristown; Atlanta, Ga., and Austell, and Chattanooga, Tenn., and Ooltewah Junction. At Lynchburg Va., where much freight is received from the Chesapeake & Ohio and Norfolk & Western, a new line around Lynchburg has become necessary, and double track for about 30 miles south is essential. These five gauntlets, as single-track lines, limited the capacity of the whole system, since practically all of the traffic handled between the East and the West and between the North and South had to pass over one or more of them and their maximum capacity as single-track lines had been reached. This throttling of the gauntlets affected the development of the branch lines and of the whole system. With the exception of the Lynchburg line these gauntlets will shortly be double-tracked, but there is further necessity of three other stretches of second track not yet undertaken, as well as double track for 5 to 10 miles outside of all principal terminals. What has been done to carry out this general policy of second track and line improvement and the new construction of the year is listed in the report in great detail. It was summarized in

in the operating statistics. Although the average carload increased 2 per cent., the revenue trainload decreased from 204 tons in 1906 to 201 tons last year. Including company freight, the trainload was 236 tons in each year. The average distance haul per ton was 158 miles, against 165 in 1906. There was a decrease of 5 per cent. in the ton-mile rate. The freight earnings increased 3 per cent., while the passenger earnings increased 11 per cent.

The state railroad legislation of the year has been more uniformly severe in the southern states than in any other part of the country. The Southern Railway, penetrating as it does almost every one of the southern commonwealths, has been to a remarkable degree exposed to this hostility. So important have its relations with the public become that President Finley since his election has spent much of his time and taken advantage of every opportunity to bring before the people of his territory the ideal which he has set up of a railroad's duties towards its patrons. He sums up this ideal, and the rate legislation of the year as follows:

"As a railroad must depend for its prosperity on the confidence and support of the public served by it, the policy of Southern Railway is to merit the confidence and support of every community which it serves. Efforts are being made to cultivate closer relations with all the public and especially with the men in all lines of business who are most directly interested in the adequacy and efficiency

of transportation facilities, and to bring about a realization on their part that the company has a direct and vital interest in the success of their individual enterprises and in the prosperity of their communities. In all dealings with the public it is the purpose of the management to cultivate a spirit of co-operation, to deal justly with all the patrons of the company on the basis of sound business and economic principles, and to this end in particular special efforts have been made to bring about courteous and considerate treatment by all employees of every person transacting business with the company. These endeavors have not been fruitless. There is increasing evidence that the thinking people in the territory served by the Southern Railway appreciate the fact that they can only attain the highest degree of prosperity if they are served by carriers able to increase their facilities so as to keep pace with the growing demand for their service, and also that increased transportation facilities are of much more importance to them than any possible reduction in charges. There is a growing public opinion, among those who actually use the railroads of the South, in favor of legislative and administrative policies that will recognize that a railroad company is a business institution, subject to the same economic laws that control all other business enterprises, and that it cannot obtain new capital for the enlargement of its facilities unless investors can have a reasonable assurance that its income will be sufficient to defray its operating expenses and fixed charges, and leave a reasonable balance for dividends and surplus.

"It must be recorded, however, that during the year drastic action was taken by some of the states in which this company operates (similar to action taken in many of the other states of the Union) to reduce the maximum passenger rates. In Illinois and Indiana, where the interests of this company were small in comparison with other lines, it followed the lead of the roads having most at stake, and put the reduced rates in effect under protest, reserving the right to contest them in the future. In Alabama, where a 2½-cent rate was established by the legislature, in North Carolina, where a 2¼-cent rate was established by the legislature, and in Virginia, where a 2-cent rate was established by the Corporation Commission, the interests of this company were so large, and the effect of the reduced rate so hurtful to its revenues, that, by direction of the board of directors, suits were brought in the appropriate Federal courts to test the constitutionality of the rates, and to secure for the property the protection of the fourteenth amendment to the constitution of the United States.

"The disputed rates have been put in effect pending determination of these cases on their merits. This was not done, however, until the record was put in shape to present the fundamental questions involved to the United States Supreme Court. The board has considered it essential, not only in the interest of the owners of the property, but in the interest of the public (whose interest it is that the railroads shall not be deprived of the means of providing adequate facilities for the commerce of the country), that the issues raised by the action of these states, whether investments in railroad properties are entitled to the same measure of protection as other property and whether they can be deprived, by any form of state action, of the effective protection of the constitution of the United States, shall be finally settled with the least possible delay."

The following table summarizes, according to our usual method, the results of operation of the last two years ended June 30:

	1907.	1906.
Mileage worked	7,547	7,374
Passenger earnings	\$14,683,006	\$13,259,114
Freight earnings	37,368,095	36,141,547
Gross earnings	56,657,994	56,641,439
Maint. way and structures	7,660,168	7,122,355
Maint. of equipment	9,576,042	8,588,452
Conducting transportation	23,941,599	20,810,940
Operating expenses	43,068,547	38,274,102
Net earnings	13,589,445	15,367,337
Other income	1,597,225	1,214,125
Total income before charges	15,186,670	16,581,462
Fixed charges and taxes	12,896,349	11,352,396
Net income	2,290,321	5,229,066
Dividends	2,400,000*	3,000,000
Improvement appropriations ..	536,334	999,827
Year's surplus	646,013†	1,229,239

*The October dividend in 1907, amounting to \$900,000 (1½ per cent. on the preferred stock) was charged to profit and loss, leaving a surplus for the year shown in the income account of \$253,987. The October, 1906, dividend (2½ per cent.) was charged to income.

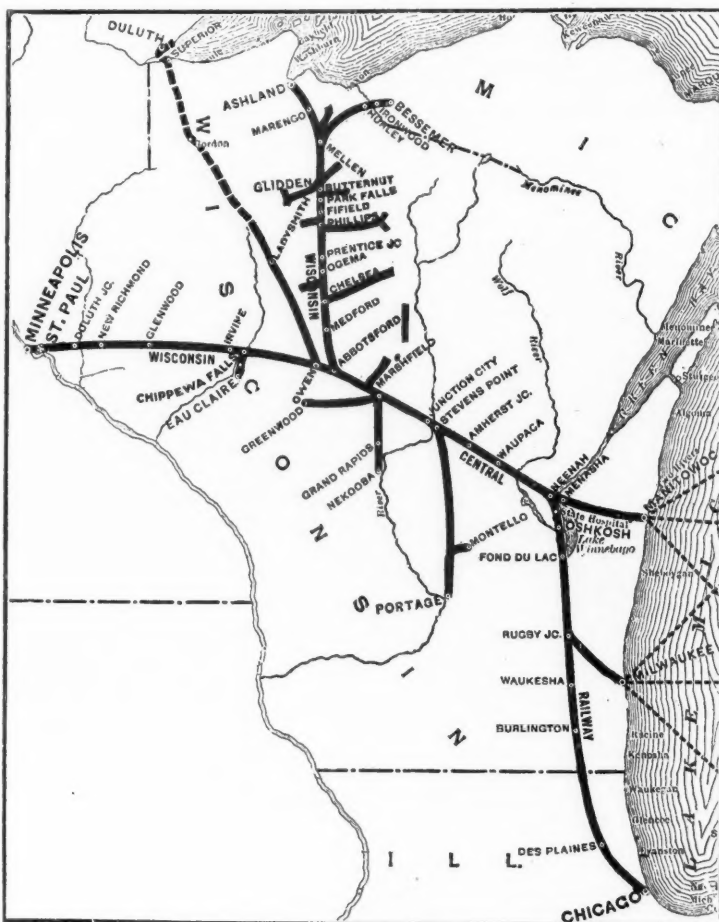
†Deficit.

Wisconsin Central.

In October, 1906, W. A. Bradford, President of the Chicago, Cincinnati & Louisville, having with associates bought control of the majority of the stock of the Wisconsin Central, was elected President. The current report for the year ended June 30, 1907, therefore, covers the results of eight months of operation by the new management. Gross earnings show an increase of 6 per cent., from

\$7,100,000 to \$7,600,000. Operating expenses increased 4 per cent., leaving net earnings of \$2,850,000, against \$2,580,000 in 1906, a gain of 11 per cent. The operating ratio was reduced from 63.8 to 62.4 per cent. There was a net income after charges of about \$1,000,000, against \$737,000 in the previous year. This was carried to profit and loss, without any improvement appropriation, making a balance to the credit of profit and loss, after a deduction of \$28,000, of \$1,852,377. This is on the whole a satisfactory showing for the year. It must be observed, however, that operating expenses were kept down through the maintenance rather than the conducting transportation accounts, and the year's surplus increased by not making an appropriation for improvements.

While there was a trifling increase in maintenance of equipment and a decrease in maintenance of way, conducting transportation increased \$240,000. Maintenance of way and structures cost \$828 per mile of road (average mileage operated) against \$880 in 1906. There was spent on equipment repairs \$1,539 per locomotive, against \$1,683 in 1906; \$654 per passenger car, against \$558 in 1906, and \$44 per freight car, against \$40 in 1906. The figures for maintaining the locomotives and freight cars are



Wisconsin Central.

decidedly low as compared with other railroads in the same territory. Thus it appears that the favorable operating results of the year were gained by keeping down the maintenance figures to about minimum requirements.

No figures are given of freight traffic by commodities, the only information on this subject being the statement that there were 4,397,000 tons of freight carried, against 4,343,000 in 1906. The average distance haul per ton was 184 miles, against 185 miles in the previous year. The ton-mile rate, however, increased from 0.66 cents in 1906 to 0.69 cents last year. On the other hand, earnings per freight-train mile decreased slightly and the average trainload (whether revenue or including company freight is not stated) fell from 325 tons to 308 tons.

On April 25, 1907, the company's large freight station at Minneapolis and its contents were burned, a loss half of which was covered by insurance. Of the other half (amount not stated), \$20,000 was charged to operating expenses. To replace this station and at the same time enlarge the road's facilities at Minneapolis in proportion to the growth of the traffic, contracts have been let for a reinforced concrete freight station 417 ft. long, 66 ft. wide at the north end, 98 ft. wide at the south end and four stories high. The south end is to front on Hennepin avenue, the principal commercial street of Minneapolis. A viaduct connected with the second floor will extend from Hennepin avenue to First avenue north. The

cost, including the necessary brick paving, changing of tracks, etc., is estimated at \$180,000.

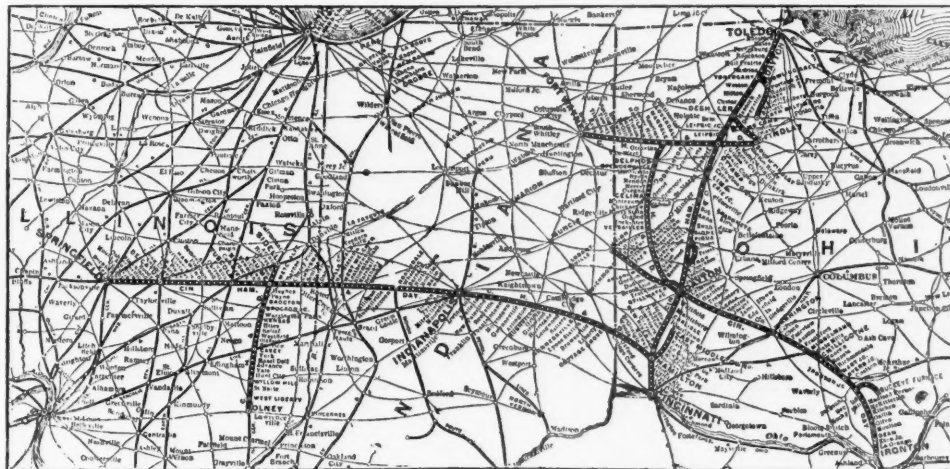
Work is actively under way on the extension of the line from Ladysmith to Superior and Duluth. Ten miles of track had been laid on October 8, 1907, and more was to be put down as soon as the grade was available. Most of the clearing, grubbing, grading and pile driving was finished. Steel bridges will be erected as soon as the track is ready for them. After prolonged negotiations, a franchise for entrance to the city of Duluth has been secured. Contracts for the construction which it involves have been made and work is now in progress. Agreements for crossing other railroads and a contract for use of the Northern Pacific's bridge across the St. Louis river have also been made.

The following table shows for the last two years the principal results of operation:

	1907.	1906.
Mileage worked	1,018	977
Passenger earnings	\$1,627,492	\$1,481,175
Freight earnings	5,610,733	5,317,237
Gross earnings	5,577,179	7,118,576
Maint. way and structures	843,192	859,723
Maint. of equipment	812,851	806,666
Conducting transportation	2,858,993	2,618,434
Operating expenses	4,730,093	4,542,477
Net earnings	2,847,086	2,576,100
Net income	998,206	736,938
Improvement appropriations		373,421
Year's surplus	998,206	363,517

Cincinnati, Hamilton & Dayton.

It was not possible to bring about such satisfactory results on the Cincinnati, Hamilton & Dayton as those described in the review of the annual report of the Pere Marquette last week. The same methods have been applied and in the same way, but whether because as the head of the "Great Central" consolidation it became more deeply involved than its controlled road, or because, lying in more competitive territory than the Pere Marquette, it has not been able to compete as favorably with other solvent rail-



Cincinnati, Hamilton & Dayton.

roads, the Cincinnati, Hamilton & Dayton has not yet progressed to the point at which it can stand on its own feet, as a result of its earnings. The real reason for this state of affairs is probably contained in the concluding statement of the receiver's report, commending the results obtained by the officers and employees, which is as follows:

"The year's business has been done without additions to the motive power, equipment and facilities, which have been in view for several years and are sorely needed. The results accomplished nevertheless would not have been possible without the greatest care and intelligent devotion to their duties on the part of the officers and employees. I cannot close this report without giving them the credit which is justly due."

Apparently, it has been a case of a railroad weakened by past mismanagement and in need of new locomotives, cars and operating facilities trying to hold its own in a territory richly supplied with competing railroads. Part of the Pere Marquette's progress, on the other hand, is no doubt due to the fact that its equipment is much of it new and the rest in good condition.

As in the case of the Pere Marquette, a number of entries in the report suggest faulty accounting methods in earlier years. For instance, among last year's additions and improvements \$118,000 is shown as a credit to new bridges and culverts. This amount was at the same time charged to operating expenses to adjust charges for bridges rebuilt during 1905 and 1906 charged to additions and improvements, but not properly so chargeable. There has also been \$107,000 charged to profit and loss as depreciation on equipment; depreciation which was all prior to the last fiscal year and on cars and engines of obsolete type which could not be used for present day operation.

The past year's unit maintenance charges, though scarcely ade-

quate, show up better than those of the preceding years. The following table shows the comparison:

	1907.	1906.	1905.	1904.
Maintenance of way, per mile....	1,039	1,102	871	767
Repairs, locomotives, pr locomotive	2,439	2,108	1,920	1,957
" passenger cars, per car....	459	487	473	458
" freight cars, per car.....	54	46	33	39

The equipment figures for 1907 are really somewhat lower than they seem, because no new equipment has been added during the year, for the cost of repairs per locomotive and per car was more than if some proportion of the equipment had been new, requiring few repairs.

The outstanding 6 per cent. receiver's certificates are shown in the following list of those issued during the year:

Outstanding June 30, 1906	\$511,830
Issued July 2, 1906, to provide funds to pay interest due July 1, 1906, on the following bonds:	
Dayton & Michigan R.R. consolidated mortgage 5 per cent. bonds.....	\$68,200
Cincinnati, Hamilton & Dayton Ry.: 2d (now 1st) mort. 4½ per cent. bonds..	45,000
Refunding mortgage 4 per cent. bonds..	226,140
Cincinnati, Indianapolis & Western Ry., 1st and refunding mort. 4 per cent. bonds..	93,440
Indiana, Decatur & Western Ry. 1st mortgage 5 per cent. bonds.....	79,050
	511,830

Total outstanding June 30, 1907..... \$1,023,660

The January, 1907, interest on these same bonds was paid out of earnings.

Gross earnings were \$8,900,000 against \$8,400,000 in 1906. Most of this increase, however, was used up in operating expenses, leaving net earnings of \$2,165,000 against just under \$2,000,000 in 1906. The payments for taxes were a little more than half as much as in 1906. The reason for this was that in that year a half year's taxes omitted in 1905 were charged to the 1906 earnings, for which no corresponding deduction appears in last year's account. There was a deficit after fixed charges of \$861,000, which is less by \$286,000 than in 1906. It must also be remembered that the item of fixed charges includes interest amounting to \$675,000 on the \$15,000,000 collateral trust 4½ per cent. notes which are in default.

The expenses show no especially striking changes during the year. There was a decrease of \$65,000 in maintenance of way, an increase of \$167,000 in maintenance of equipment and of \$251,000 in conducting transportation. General expenses increased \$9,000. Under this head there was an increase of \$22,000 in salaries of clerks and attendants and a decrease of \$13,000 in law expenses. The expenses were increased and at the same time the earnings reduced by winter and spring floods throughout the Ohio valley and especially in the vicinity of Cincinnati. These caused considerable business to be temporarily diverted to other gateways and railroads. In the vicinity of Chillicothe on the Ironton line extraordinary repairs to embankments were made necessary by unprecedented floods during the month of March.

The operation of the road during the year was more efficient. The revenue ton-miles increased from 940,000,000 to over 1,000,000,000, or 6 per cent., yet there was an increase of only 2 per cent. in the freight-train mileage. While the miles run by loaded freight cars increased from 47,000,000 to 49,000,000, the miles run by empty freight cars decreased. The revenue trainload rose from 371 tons to 397 tons, and the revenue carload from 20 to 21 tons. In face of a decrease in the ton-mile rate received, the average revenue per freight-train mile increased from \$2.37 to \$2.45. In this respect the passenger results furnish a parallel. The passenger-mile rate decreased but the average passenger revenue per train-mile increased from 64 cents to 68 cents. Including mail and express, the passenger-train earnings per mile rose from 78 cents to 83 cents.

The net amount spent during the year on additions and betterments was about \$100,000, or \$100 per mile. There were 12 miles of new 85-lb. rails laid on the northern end of the Cincinnati-Toledo main line between Hamilton and Toledo. This released 70-lb. rail which was relaid partly further south on the Cincinnati-Toledo line and partly on a branch line. Work has been begun on the enlargement of the yards at Toledo and at Lima. Most of the new 85-lb. rails laid by the Pere Marquette during the year were on its Toledo division, showing that both roads have joined in the improvement of their through line between Cincinnati and Detroit.

The income results of the last three years are shown in the following table:

	1907.	1906.	1905.
Mileage worked	1,038	1,038	1,038
Passenger earnings.....	\$1,871,019	\$1,813,561	\$1,912,855
Freight earnings	6,374,235	5,996,802	5,694,283
Gross earnings	8,946,935	8,398,418	8,008,918
Maint. way & structures	1,078,613	1,143,369	903,936
Maint. of equipment	1,571,756	1,404,704	1,201,603
Conduct'g transportation	3,891,611	3,640,160	3,661,326
Operating expenses	6,782,126	6,419,140	6,004,966
Net earnings	2,164,809	1,979,278	2,003,952
Net deficit	861,354	1,147,631	241,224

Mexican Central.

The Mexican Central is still a nominally independent property, for the financial upheaval has prevented the Mexican government from finally carrying out the terms of its merger with the National Lines of Mexico. The government, however, holds a majority of the Mexican Central stock and has not abandoned its plans for the consolidation.

The report for the year ended June 30, 1907, is more complete than those of previous years, which have been silent in regard to many important details of the company's operations. Two needed tables are added, one showing in considerable detail the classification of freight by commodities, the other the operating statistics for the freight, passenger and total traffic and the figures for train and car loading and mileage.

Gross earnings were \$15,600,000, an increase of 10 per cent. over 1906. This total includes \$85,000 earnings from construction freight, following the outworn practice reintroduced in 1906 of including earnings from company business. Operating expenses increased 11 per cent., leaving net earnings of \$4,580,000, an increase of 7 per cent. There was, however, owing to the increase in fixed charges through large note issues, a net deficit after charges of \$140,000. It was therefore only by withdrawing \$1,450,000 from the subsidy trust fund—made up of payments originally made by the Mexican government as subsidies—that it was possible to use \$1,315,000 for betterments and improvements. Even by so doing, the profit and loss surplus of the preceding year which is also the total profit and loss surplus of the company had to be called upon for a few thousand dollars.

This bolstering up of the net income from operation cannot last much longer for only \$1,186,000 which is less than the amount withdrawn last year remains in the subsidy fund. When this is gone the Mexican Central as an independent property would be likely to have a hard time to meet its fixed charges, and a harder to appropriate anything for betterments and improvements. It has \$35,600,000 notes, collateral and equipment, outstanding, most of them maturing within the next four years. Even with higher freight rates, some of which were put in effect on August 9, 1907, with others still to be sanctioned by the government, the road would hardly be in a position by 1911, with its subsidy trust fund probably used up three years before and the consequent stopping of general improvements, to successfully refund this large amount of maturing indebtedness. The government's consolidation, however, as soon as it can be carried out, is expected to solve these difficulties by refunding the outstanding notes in the new securities of the consolidated company.

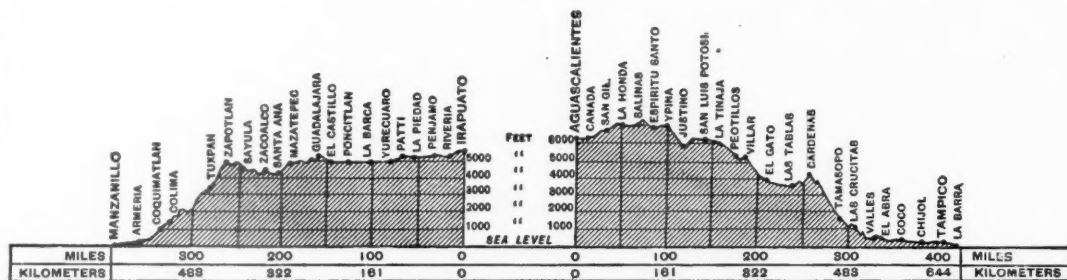
The increase in earnings during the year came almost wholly in the passenger department. Freight earnings increased only \$25,000 over the previous year. This small increase is due, according to the report, to bad washouts during the rainy season in August and September, 1906, and to a serious strike in the mechanical shops during the same period. Passenger earnings, however, rose \$1,250,000, or 47 per cent., over the previous year. This was due only in part to an increase in passenger travel, for it is estimated

undermaintained. Maintenance of way cost \$624 per mile against \$514 in 1906, an increase of 21 per cent. to be sure, but by no means enough to adequately maintain a large railroad system with much through line, even in Mexico.

Repairs, including expenditures for converting locomotives into oil burners, cost \$3,135 per locomotive, against \$2,430 in 1906; \$553 per passenger car, against \$583 in 1906, and \$79 per freight car, against \$99 in 1906. The reduction in the freight car figure is due to the fact that 2,142 freight cars were added to the equipment during the year, while the amount spent on freight car repairs was almost the same in the two years. Besides the freight cars, 60 locomotives and 29 passenger cars were added to the equipment at a total cost for the three classes of new equipment of \$3,900,000. There are now 150 oil burning locomotives on the Mexican Central, 60 of which are new, as against 50 oil burners a year ago. The effect of this change is shown in a decrease of 18 per cent. in the cost of locomotive fuel, including coal, wood and oil; with an increase in the revenue train mileage from 7,700,000 in 1906 to 8,200,000 last year.

There was a decrease in the revenue ton mileage, the freight density, the average haul and the freight earnings per mile of road and per train mile. On the other hand, the total freight earnings and the ton-mile rate were larger. The train-load, including company freight, was 227 tons, against 250 tons in 1906.

The passenger density increased from 56,372 passengers one

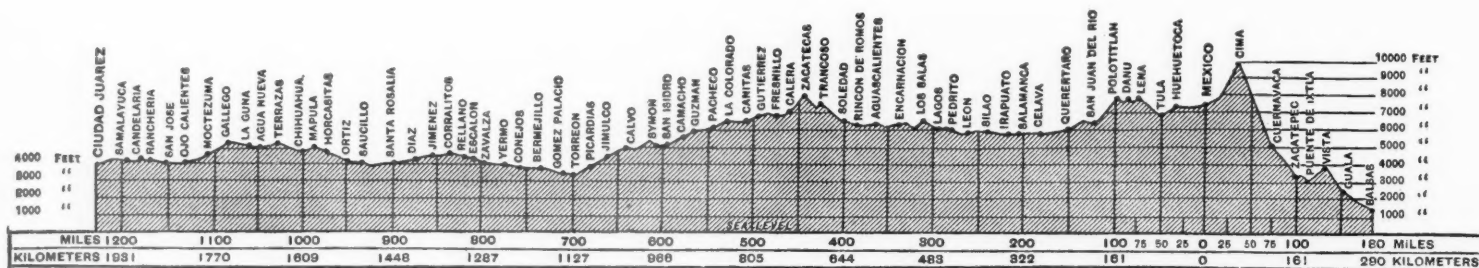


Profiles from Manzanillo to Irapuato and from Aguascalientes to Tampico; Mexican Central.

mile per mile of road to 85,656, or over 50 per cent. The average passenger trip rose from 50 miles to 64 miles, and the total passenger revenue from \$2,650,000 to \$3,900,000. Even with a slight decrease in the passenger-mile rate, the passenger earnings per train-mile were \$2.91, against \$2.13 in 1906.

Pulque, native wines and liquors, and ixtle, henequen and other fibers are unusual commodity classifications to come upon in a railroad report. They suggest the semi-tropical character of the southern part of the Mexican Central's territory. Pulque is the fermented juice of the maguey or century plant. Ore makes up 24 per cent. of the total tonnage and metals and mineral products together, 55 per cent. Forest products include 9 per cent., of which the largest classification is firewood, 5 per cent. Agricultural products cover 22 per cent., with corn 5 per cent., the largest item. Miscellaneous, including manufactures, make up 11 per cent. of the total, against 10 per cent. in 1906.

The extension of the Guadalajara division, from Tuxpan to the Pacific coast at Manzanillo is now progressing rapidly. This construction was begun three years ago and was to have been finished on January 1, 1908, but in October of last year there came a disastrous flood "which was so extraordinary as to be a marvel of nature." Part of the construction work was washed out and the whole line



Profile of Main Line from the United States Boundary to Mexico City and Balsas; Mexican Central.

that over \$500,000 of the increase is the direct result of having tickets and cash fares collected by train auditors instead of by conductors. This system was begun in the fall of 1906 and is now used on every passenger train on the road. Many Mexican Central conductors must be economizing as a result.

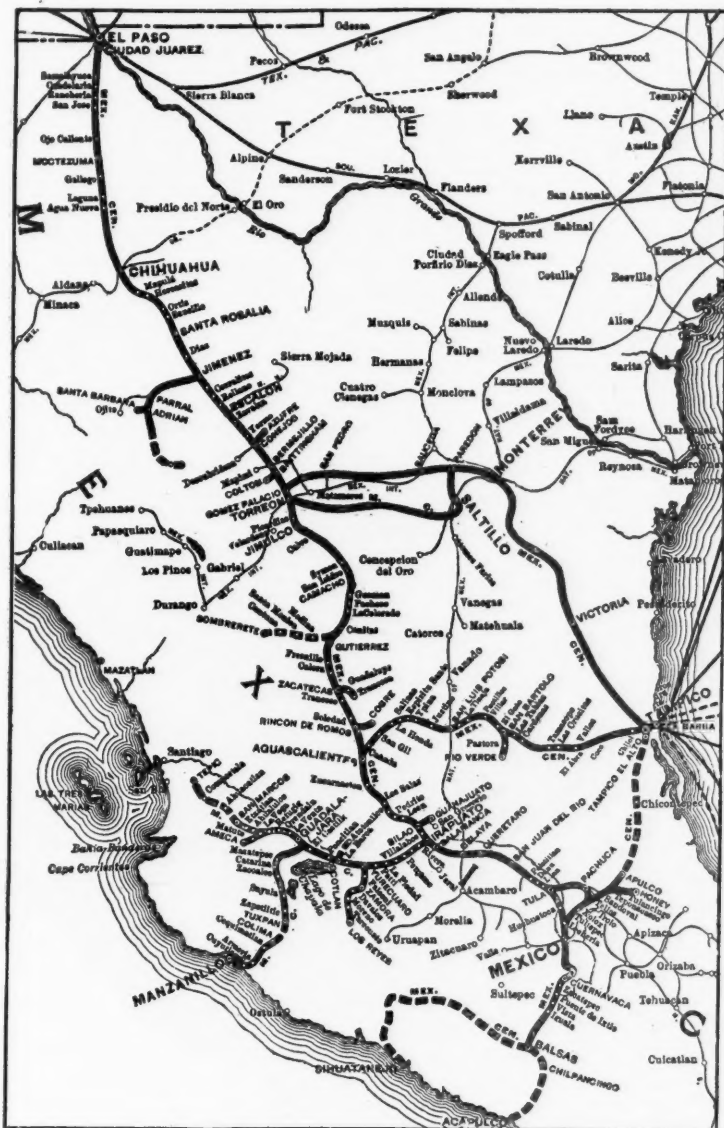
The unit charge in operating expenses for maintenance of way shows that without the help of the subsidy trust fund, and the resulting money for betterments and improvements, all of which were spent on way and structures, the line would have been greatly

had to be rebuilt above this extraordinary flood level. This has increased the estimated cost and delayed the construction so that the road will not be opened for business before July 1, 1908. Construction of another important line long planned was begun during the year. This is the cut-off from Apulco to Tampico, which will shorten the distance between Mexico City and Tampico from 778 to 278 miles. Work was begun on the first 31 miles of this line about May 1, 1907.

Profiles of the new through line to the Pacific coast, of the

line from Aguascalientes to Tampico, and of the main line south from El Paso, Tex., are shown herewith.

The following table summarizes the results of operation of the last two years. Where figures are shown only in Mexican currency



Mexican Central.

in the report they have been converted into United States currency at the rate of \$2 per United States dollar:

	1907.	1906.
Mileage worked	3,195	3,156
Passenger earnings	\$3,900,135	\$2,650,011
Freight earnings	10,814,225	10,788,449
Gross earnings	15,618,098	14,188,403
Maint. way and structures	1,997,749	1,622,939
Maint. of equipment	2,581,368	2,031,697
Transp. and traffic exp.	5,744,597	5,526,622
Operating expenses	11,035,089	9,605,323
Net earnings	4,604,456	4,287,862
Net income after charges	141,474*	114,386
Investment appropriations	1,315,430	695,546
Year's income deficit	1,456,904	581,160
Profit and loss surplus	208,130	210,710*
Used from subsidy trust fund	1,450,000	1,000,000
Final total profit and loss surp.	201,226	208,130

*Deficit.

Chicago & Eastern Illinois.

This year's report of the Chicago & Eastern Illinois is for the first time issued in the same form as the annual statements of the larger Rock Island properties. It is large size (9 x 12), and contains full tables of the operating and other results of the year and information describing the securities of the company. This is a change much to be commended, as the reports of the Chicago, Rock Island & Pacific and the St. Louis & San Francisco are among the best railroad reports issued. The entire capital stock of the Chicago & Eastern Illinois is owned by the St. Louis & San Francisco, all of whose common stock is in turn owned by the Rock Island Company. The Chicago & Eastern Illinois in turn owns \$3,161,450 of the \$3,987,383 common stock of the Evansville & Terre Haute, with which is now consolidated the Evansville & Indianapolis.

The Chicago & Eastern Illinois and its subsidiaries are shown on the accompanying map. As will there be seen the Chicago &

Eastern Illinois gives the Rock Island a short through line between Chicago and St. Louis, and also connects Chicago with the coal fields in eastern Illinois and western Indiana. With the Louisville & Nashville, it forms part of a through line to Nashville, Tenn.; Birmingham and Mobile, Ala., and New Orleans. In connection with the Nashville, Chattanooga & St. Louis; the Western & Atlantic; the Central of Georgia; the Georgia, Southern & Florida, and the Atlantic Coast Line, it forms a through line from Chicago to Jacksonville, Fla. Bituminous coal furnishes over 60 per cent. of its tonnage.

Like all Rock Island lines, the most striking thing about the past year's operations is the betterment of the property out of earnings. There was 25 per cent. more spent on maintenance of equipment and 57 per cent. more on maintenance of way and structures than in the previous year. Per mile of road owned and leased, maintenance of way cost \$792, compared with \$511 in 1906. There were on the average 324 ties renewed on each of the 1,001 miles of main, second and third track, against 224 per mile in 1906. Over 40 miles of 85-lb. rails were laid to replace lighter sections, so that on June 30, 1907, 18 per cent. of the mileage was laid with 85-lb. rails as compared with 14 per cent. a year earlier. Heavy expenditures were made in replacing old wooden bridges with new and stronger wooden structures, also in strengthening other existing bridges to provide for heavier equipment now in use. Yet in spite of the large increase in maintenance of way expenses, even last year's figure seems low for a road with a freight traffic density of over 2,000,000 tons one mile per mile of road.

Equipment maintenance cost \$2,007 per locomotive, against \$2,084 in 1906; \$872 per passenger car, against \$884 in 1906; \$45 per freight car, against \$43 in 1906, and \$43 per work car, against \$20 in 1906. Under modern conditions it is probable that the average freight car now in service cannot be adequately maintained for \$45 a year. The Chicago & Eastern Illinois, however, has a large proportion of new and modern steel coal cars which do not cost much for repairs during the first few years of service. Furthermore, a coal car does not cost as much to repair as a box car of the same age, and the Chicago & Eastern Illinois has somewhere nearly twice as much flat and coal cars as box cars.

There were put in service during the year 63 new locomotives, 10 passenger-train cars and 3,250 coal cars at a cost of \$3,231,800. Ten of the new locomotives were fast passenger Atlantic engines, 30 were heavy consolidation freight, and 23 switching. There were 15 locomotives and 2,458 freight cars, mostly of small capacity, dropped from the equipment register. This throws another explanatory sidelight on the low charge for maintenance per freight car. For delivery before January 1, 1908, there have been ordered three library-baggage and three chair cars and 2,000 steel underframe National dump cars of 100,000 lbs. capacity.

Although there was an increase of 5,600,000 passengers carried one mile and 221,000,000 tons of freight moved one mile, the expense of getting and carrying the business decreased 6 per cent. This is remarkable not only because of the increased business, but also because the year was an expensive one in cost of wages, supplies and almost everything else. The decrease in conducting transportation was brought about through the changes in the items of per diem and hire of equipment. Instead of paying out \$106,000 for per diem and \$49,000 for equipment hire as in 1906, the company was a creditor to the extent of \$402,000 under the first and \$26,000 under the second head, a total decrease in these payments for the year of \$583,000. There was also a large decrease in the amount paid out for injuries to persons, most of it due to smaller payments under that head but part of it to the fact that last year part of the injury payments were charged to maintenance of way and structures and part to maintenance of equipment, a new refinement in dealing with this account.

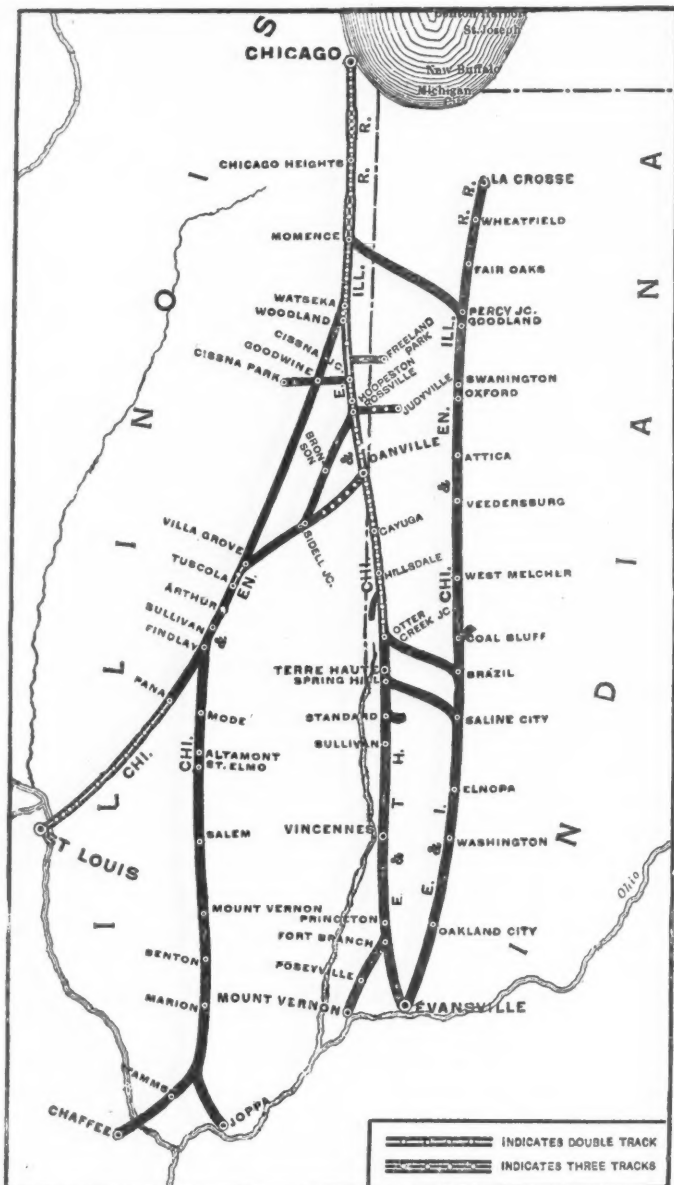
Gross earnings were \$11,300,000, an increase of \$1,400,000, or 14 per cent. Operating expenses increased \$600,000, or 9 per cent., leaving net earnings of \$4,200,000, an increase of \$800,000, or 24 per cent. The net income after charges was equal to 6 per cent. on the preferred stock, which was paid, and 15.8 on the common stock, on which 10 per cent. was paid, these payments going to the St. Louis & San Francisco to pay interest on its Chicago & Eastern Illinois stock trust certificates.

The revenue trainload was 576 tons, against 565 tons in 1906, while the average trainload including company freight, was 605 tons, a high figure. This large trainload makes it all the more remarkable that more has not been spent in the past on maintenance of way. The average haul per ton of revenue freight was 163 miles, which is just about the distance from the coal fields about Terre Haute, Ind., to Chicago.

The relative changes in the operating expense accounts due to the larger amounts spent on maintenance are sharply shown in the ratios of each class of expenses to total expenses and to gross earnings. Of the total expenses, maintenance of way was 18 per cent., against 12 per cent. in 1906, while conducting transportation was 52 per cent., against 60 per cent. in that year. Of gross earnings, maintenance of way was 11 per cent., against 8 per cent. in

1906, and conducting transportation 33 per cent., against 40 per cent. in 1906.

The locomotive repair shops and engine houses at Oaklawn (Danville, Ill.) are being enlarged at an estimated cost of \$560,000. Up to July 1, 1907, \$286,700 had been spent there, of which \$56,000 was for shop machinery and tools, \$223,000 for shops, engine houses and turntables, and \$7,000 for yard and other tracks. The plan of



Chicago & Eastern Illinois; Evansville & Terre Haute, and Evansville & Indianapolis.

enlargement of these shops was described in the *Railroad Gazette* of November 2, 1906.

The results for the past two years are given below:

	1907.	1906.
Mileage worked	948	948
Passenger earnings	\$1,684,848	\$1,603,016
Freight earnings	9,320,192	8,086,593
Gross earnings	11,337,714	9,928,563
Maint. way and structures	1,286,615	818,994
Maint. of equipment	1,812,550	1,452,005
Conducting transportation	3,706,285	3,958,430
Operating expenses	7,177,309	6,570,489
Net earnings	4,160,406	3,358,074
Net income	1,670,168	1,144,958
Dividends	1,251,622	1,187,266
Year's surplus	418,546	37,692
Depreciation*	823,166	226,469

*Charged to profit and loss.

NEW PUBLICATIONS.

Substitution of the Electric Locomotive for the Steam Locomotive. By Lewis B. Stillwell and H. St. Clair Putnam. New York: American Institute of Electrical Engineers. 130 pages; 6 in. by 9 in.; 16 illustrations. Cloth.

This book is a reprint, with the discussion, of the paper presented by the authors before the publishing association in January, 1907, from which liberal extracts were reprinted in the *Railroad Gazette* Feb. 1, 1907, together with an editorial comment on the position that had been taken. In this comment attention was called to the fact that it "seemed to be assumed that the substitution of electric

for steam power on all railroads is economical, and the authors and speakers went far beyond calculations for specific installations and entered the broad field of the entire railroad mileage of the United States from which they drew staggering totals. It seemed to be apparent that if the railroads would only make haste to get 2½ billions of new capital they could save 250 millions each year in operating expenses." In short, the paper with the discussion that followed may be considered as the ultra-electric viewpoint of the situation, in which the electric locomotive is to shortly usurp the place of the steam-driven machine, provided only the railroad managers will view the case in the light of their own true economical interests. The weak point in the paper is its neglect of financial and operating requirements and conditions. It seems to have been taken for granted that all of the gains that have been found to obtain in a congested territory and short distance transmission could be secured on long distance traffic handled far from the source of supply. And in the conclusion it was claimed that on "certain railroads, trains are now so heavy and run at such high speeds, as to tax the capacity of the most powerful steam locomotives to the limit, and the headway between trains is as small as permissible. Here, then, electrification becomes an absolute necessity if the traffic capacity of the lines is to be increased without the tremendous expense of adding new lines." The conclusions then go on to advocate the use of enough electric locomotives, in multiple control at the head of the train, to produce the increased capacity, evidently forgetful of the fact that the tractive power of some of the steam locomotives already in service is greater than the capacity of drawbars to resist it; so that it becomes difficult to understand how the use of more electric locomotives will relieve the situation.

The inference should not be drawn from this, however, that the paper is superficial or that it is valueless because it contains what may appear to some to be the exaggerations of enthusiasm. This is far from being the case. It is a careful and painstaking review of the possibilities of electric traction when viewed in its most favorable light. That the utopian condition of affairs is likely to be realized at once is not claimed, for the authors must understand that it would be impossible at once to raise the capital for the expenditures required.

As this point is the one that stands most prominently forth it overshadows the question of the relative superiority of alternating and direct-current for railroad work, though the merits of each are ably set forth by the representatives of the two great electric companies that are identified with the exploitation of one or the other system.

Locomotive Breakdowns and How to Repair Them. By W. G. Wallace. Chicago: Frederick J. Drake & Co. 285 pages; 4½ in. x 7 in.; 56 illustrations; flexible leather.

This book is a separate imprint on smaller pages, much thinner paper and a different binding, of the book on the same subject forming one of the set of seven volumes on the Art of Railroad Engineering, reviewed in the *Railroad Gazette* Oct. 11. The printed page, however, is the same and the two books bear strong evidence of having been printed from the same plates, the difference in size being made up in margin and thickness of paper. Of the two editions the single book is the more attractive though not quite so pretentious as the one in the set.

The First Steam Superheaters.

BY CHARLES R. KING.

A study of the records of drawing offices in many locomotive works brings to light the remarkable fact that steam superheaters and desiccators were designed, if not made, over half a century ago, and that some of the devices then employed would, if reconstructed experimentally with all the improvements available at the present day, answer the same purpose as many new types. The circumstance that such reheaters were abandoned sooner or later proved that the methods of construction, both of boiler and engine, with the materials formerly employed, and the lubricants available, were all unsuitable; but the principle of the superheaters was frequently good, and some of the arrangements here illustrated will be found to be very interesting.

So far as present knowledge goes the first application of a superheater to a locomotive boiler appears to be that made in 1848 by John Cockerill, of Seraing, near Liège, Belgium, and in which the steam-drying pipes were lodged in the smokebox and continued up a casing concentric with the chimney.

But the first superheaters suggestive of modern forms were, so far as is at present known, designed and patented in 1850 by M. Moncheuil, Director of the Montereau & Troyes Railroad, France. These patents belong to a series granted in 1849 for "the employment of non-saturated, superheated, steam in the boilers of stationary engines" in the name of A. de Quillacq, founder of the de Quillacq Engineering Works, who died in 1903. The additions made to these patents for locomotive boilers comprise the ordinary

types of locomotive boilers fitted with, (A) a large flue traversing the bottom of the boiler and containing superheating pipes bent backwards and forwards; (B) large flame flues between the two flue-sheets containing superheating steam-pipes also bent backwards and forwards the length of the tubes with U-caps connecting the extremities of the pipes, and (C) a superheater placed outside, on top of the boiler.

The flame-tube or fire-flue superheaters, A and B, were for

being able to regulate the heat whenever the circulation of steam through the reheating pipes had ceased, since a damper is shown in one of his other patents. In the Moncheuil smoke-flue superheaters the steam was admitted to the reheating pipes through the throttle even while the engine was standing. This was permitted by the position of the stop-valve shown in the drawings just over the valve-chests. A disk or "spreader" partially closed the large flue of the boiler at the firebox end in order, according to the text of

the patent, "to protect the ends of the superheater pipes from the direct impingement of the flames, this disk being of diameter allowing the passage of the flames between it and the internal diameter of the large flue." The drawing shows the superheating pipes running in series from end to end of the large flue. But Moncheuil claimed, besides straight U-pipes, other dispositions such as "superheating pipes forming therein a serpentine or affecting any analogous disposition."

Moncheuil was also the first originator and patentee of the smoke-tube, flame-tube or fire-tube superheater wherein the ordinary boiler flue between the tube-sheets envelops a number of small pipes with U ends through which saturated steam is sent back and forth until it becomes very highly superheated. A cross section of this now popular form of superheater is extracted from the Moncheuil-de Quillacq patent and reproduced in Fig. 4, as sufficiently explanatory of the arrangement of the flues and superheater pipes within them. The other drawings relating to it repeat, more or less, the details of the superheater pipes in the case of the large boiler flue superheater, except as concerns the number of reheating pipes or bends, which are only four in the fire-tube superheater, Fig. 4. Differing from present-day fire-tube superheaters the Moncheuil tubes were placed in the lower half of the boiler. Whether the choking up of these lower flues was found to be a serious disadvantage in actual constructions, no records are so far available to show.

The Moncheuil-de Quillacq patent claims: "For a tubular reheater composed of a great number of small tubes"; i.e., pipes, "heated by series, in tubes of suitable dimensions fixed by ferrules as are the other tubes of locomotives. In each series one extremity of a group receives saturated steam; the other extremity of the series leads the de-saturated steam to the reservoir." (See Fig. 4.)

The third superheater, referred to previously as "C," in the Moncheuil-de Quillacq patents, is contained in a long barrel on top of the steam boiler as shown in Fig. 5. In this the heat is led upwards, through the high firebox of that period, by means of a large vertical and curved flue, thence passing into the horizontal drum and enveloping a concentric superheated-steam chamber supplied

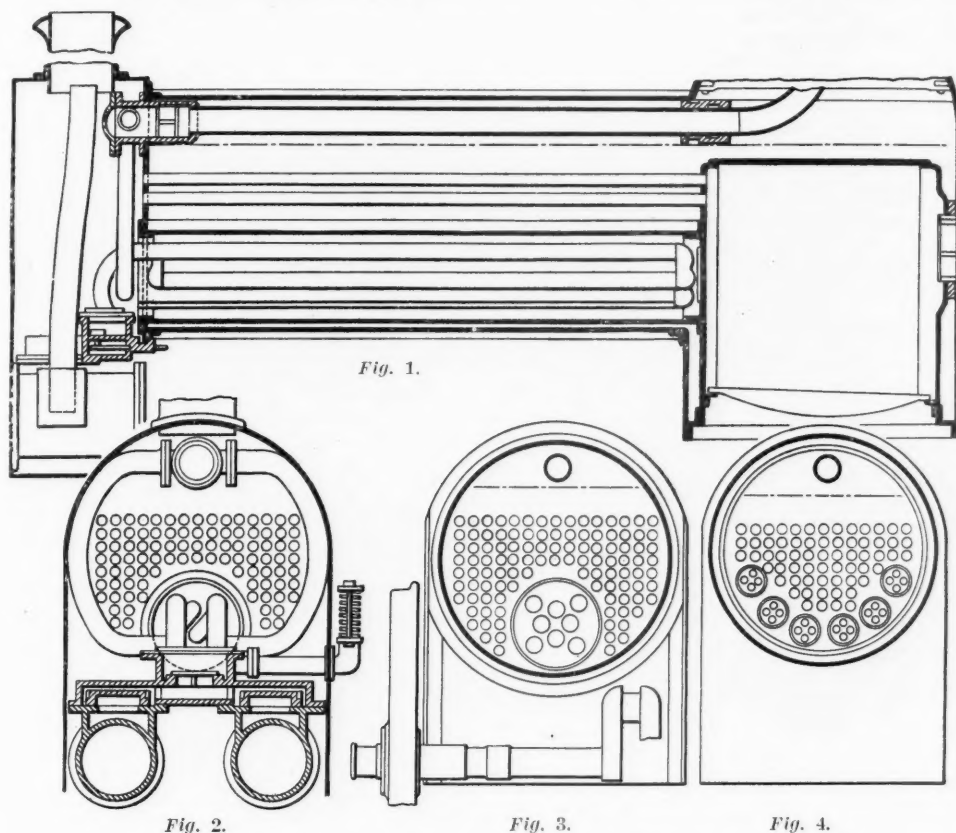


Fig. 2. Fire-tube Superheater Applied in 1850 to Express Passenger Locomotive; Montereau & Troyes Railway.

highly-superheated steam and designed for application to the boilers of the 2-2-2 type express engines of the Montereau & Troyes Railroad that had been built by the firm Hallette in the year 1847. The details relating to the first form of superheater are shown in the Figs. 1, 2 and 3, but the high firebox usual to the engines of that period, and other features, are omitted from the present reproduction. The direction of the superheater pipes is as follows: From the saturated steam-pipe to the two lowest superheating pipes and back to the firebox end; forward, through the two intermediate pipes; backward, again, through the two upper

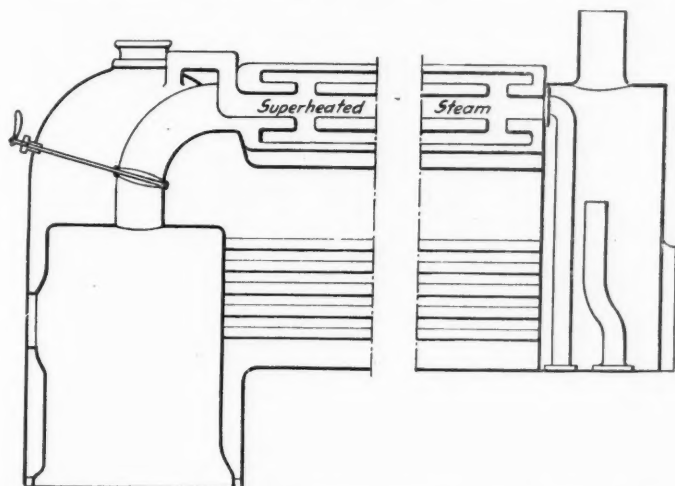


Fig. 5—Moncheuil Superheater Outside of Boiler; 1850.

pipes—the connection of their extremities with those of the lower row being by means of the two U-caps that are shown, in a diagonal position, in the smokebox section, and then forward, once more, through the two topmost pipes which are visible in both the longitudinal and cross sections of the boiler. The ends of all the pipes appear to be connected in series by means of cast U bends. No headers are shown nor any dampers for regulating the heat. It is, however, apparent that Moncheuil understood the importance of

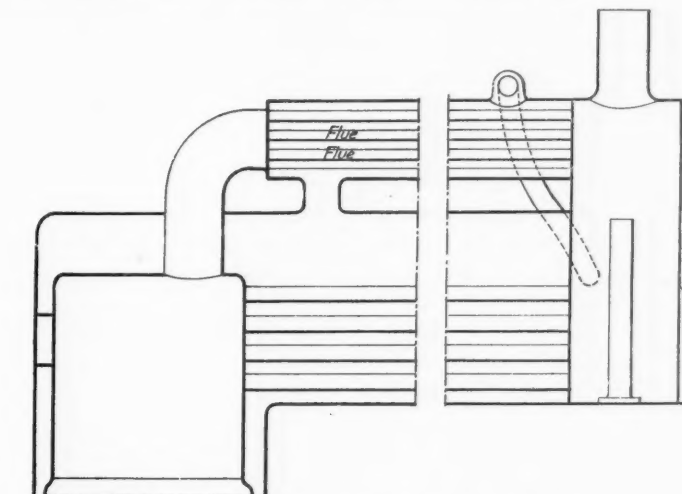


Fig. 10—Hittorf Superheater; 1869.

with saturated steam by means of a short pipe connecting it to the domed top of the firebox. A damper for cutting off or regulating the amount of heat to be passed to the superheater is shown in the curved flue.

Next in order of priority appears the serpentine firebox-superheater of John Haswell, Director of the Vienna Locomotive Works of the Privileged State Railway Association. The first superheater of this Scotch mechanical genius is dated 1852 and the old draw-

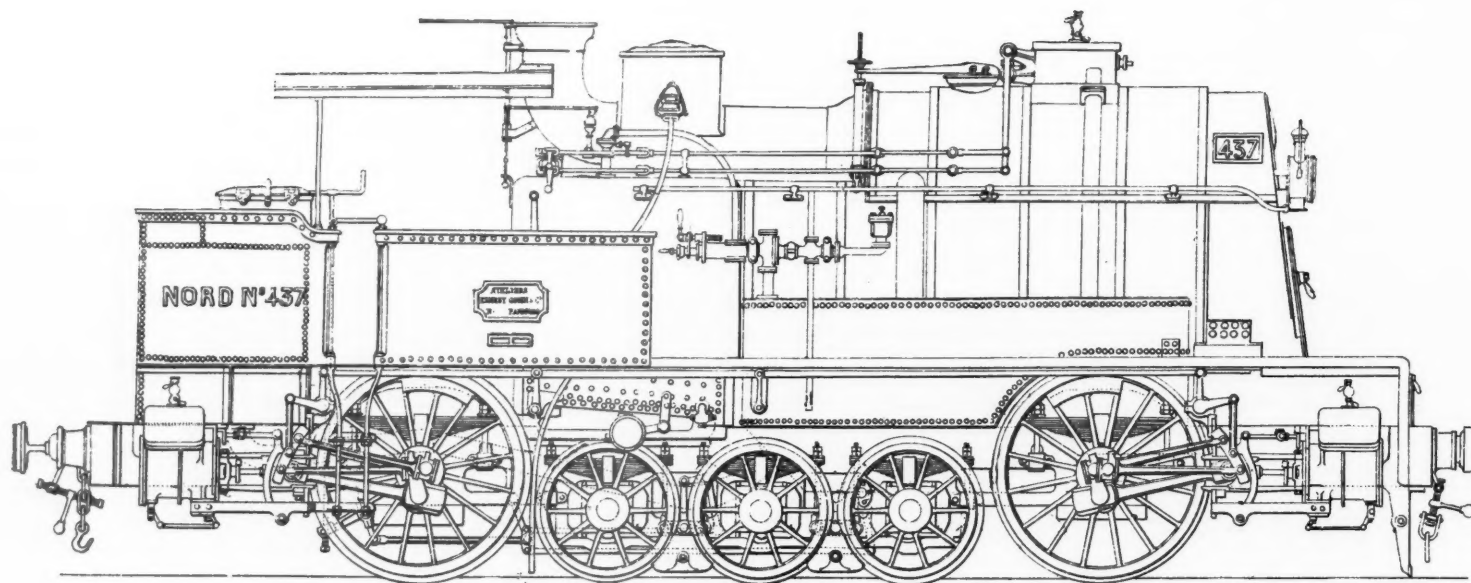
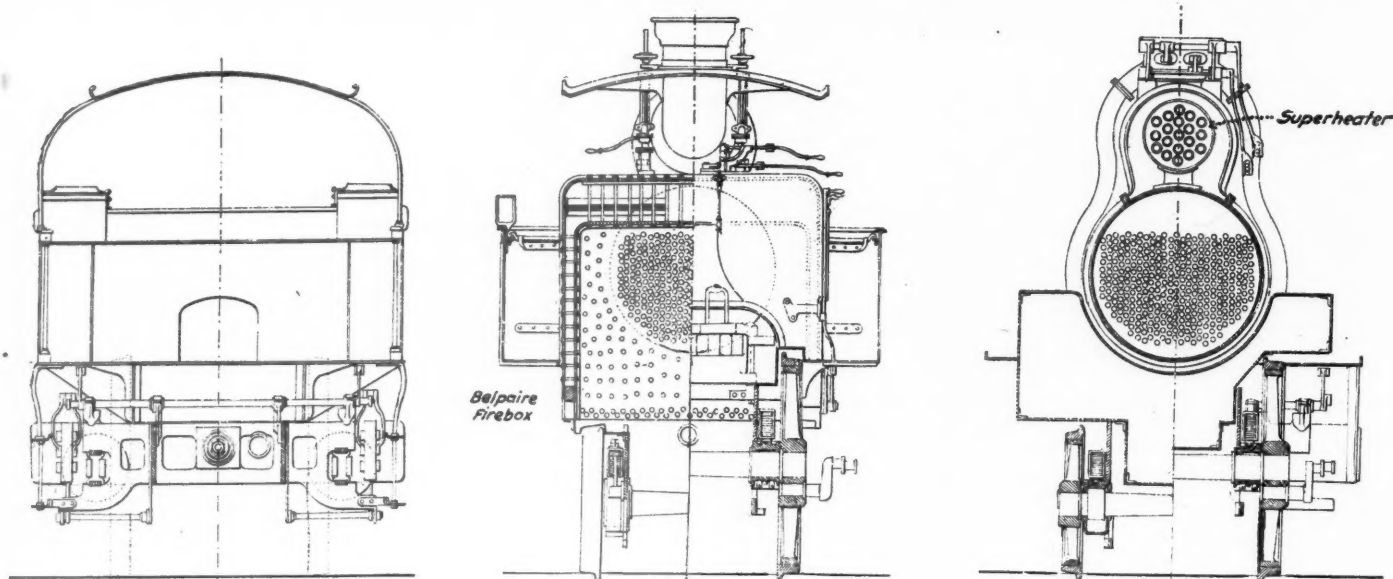


Fig. 6—Side Elevation of Double End Express Locomotive Fitted with Steam Desiccator; French Northern Railway.



Figs. 7-9—End Elevation and Cross-Section of Double End Express Locomotive with Steam Desiccator; French Northern Railway.

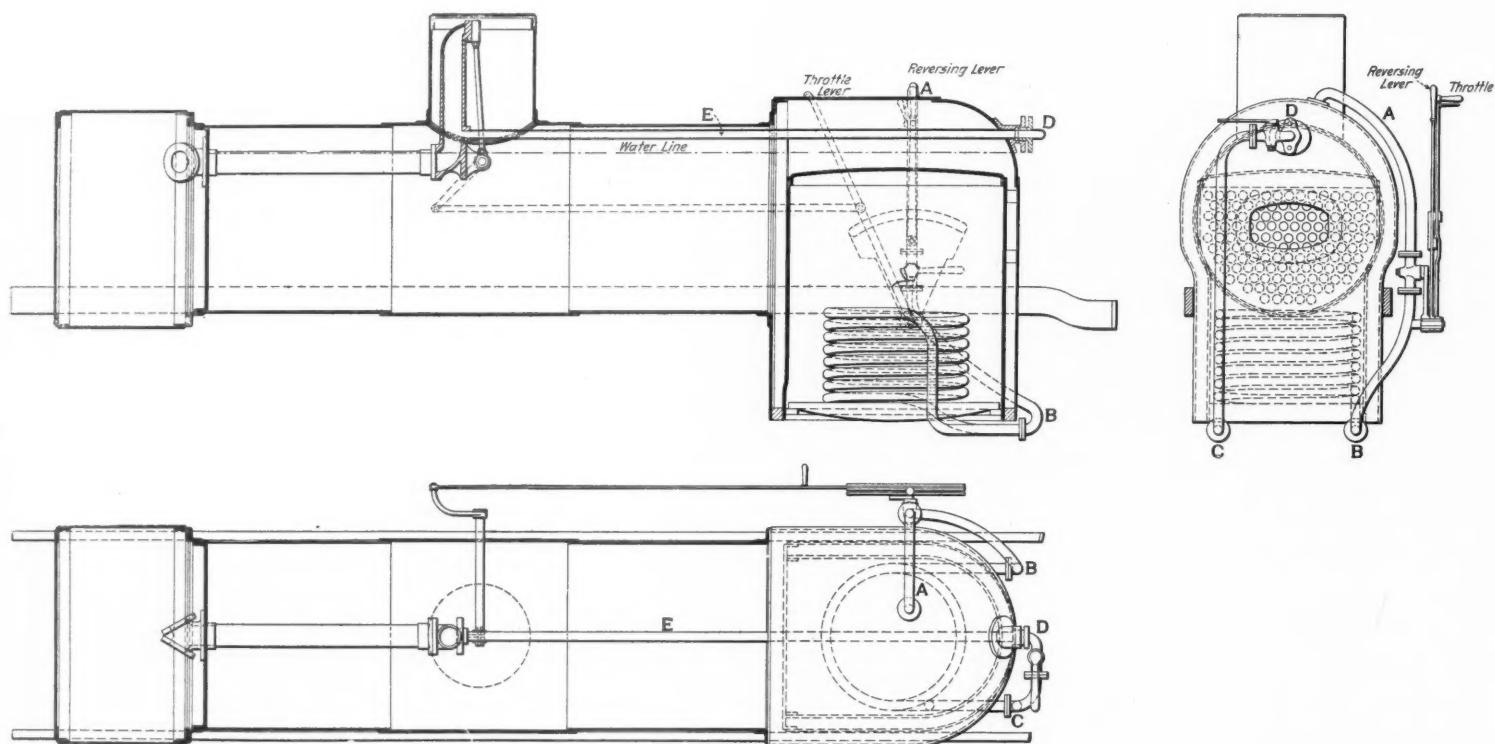


Fig. 11—Serpentine Locomotive Firebox Superheater of John Haswell; 1852.

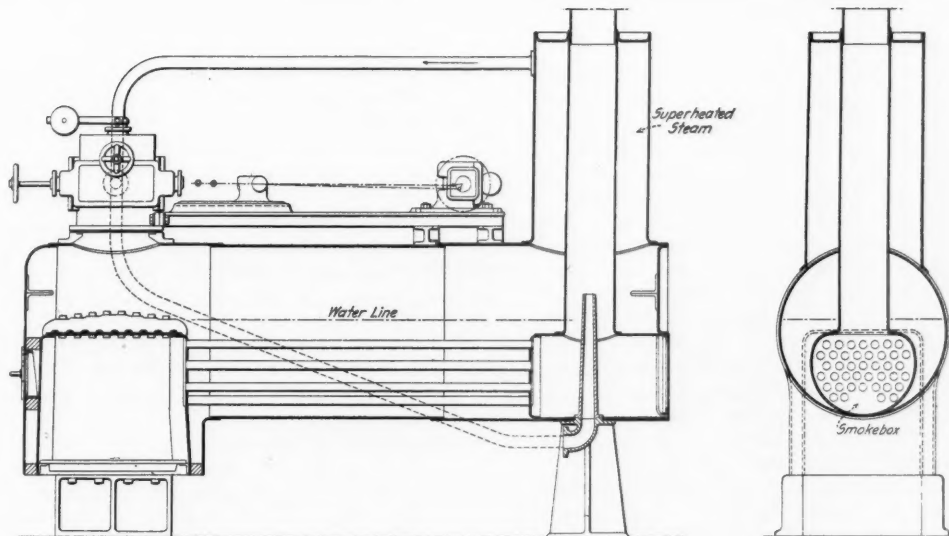


Fig. 12—Chimney Superheater or Economizer of John Haswell; 1862.

ing, recently coming to the knowledge of the writer, has been specially redrawn for reproduction in the present review. It will be seen from Fig. 11 that the Haswell superheater embodies the constructive principle of modern flash boilers although no pump or feed pipes below the water-line of the boiler are visible. Otherwise, all the other details are so fully shown as to require no description. The connection of the reversing lever to the saturated steam-inlet valve, giving automatic admission, and the stop-cock on the superheated steam pipe show the methods of control, but there is no indication as to a stop-valve being placed over the valve-

months rather than years would be better suited for indicating their dates. A small steam desiccator or heat economizer was applied about this time, but with no certainty as to date, by Messrs. Sharp, Stewart & Co., of Manchester, Eng., to one of several engines built for Egypt, as shown by the drawing reproduced in "Colburn's Locomotive Engineering," which work is to be consulted in most of the important engineering libraries. This was not a superheater properly so-called, and having but small heating surface its utility must have been doubtful.

After the high-temperature superheaters of Moncheuil and then

chest as in the Moncheuil engine. The records of the Austro-Hungarian Works do not show whether this superheater was actually constructed or tried.

After Haswell, the superheater invented by M. Montety, a French engineer, in 1855, claims attention. It comprised a large internal flue almost filling the lower part of the boiler and enveloping a serpentine coil precisely as set forth in the patent of Moncheuil, but with this difference that the saturated steam supply, and reheated-steam pipes connecting to the extremities of the double coil of serpentines, ran longitudinally along inside the coils the whole length of the large internal flue. In addition, there were steam reservoirs answering practically to the intention of "headers" in present forms of superheater. Thus, in the details, the Montety apparatus represented a certain improvement over the Moncheuil large flue-type superheater.

Between the years 1855 and 1860 steam superheaters and driers, or desiccators, were patented and made by so many persons that

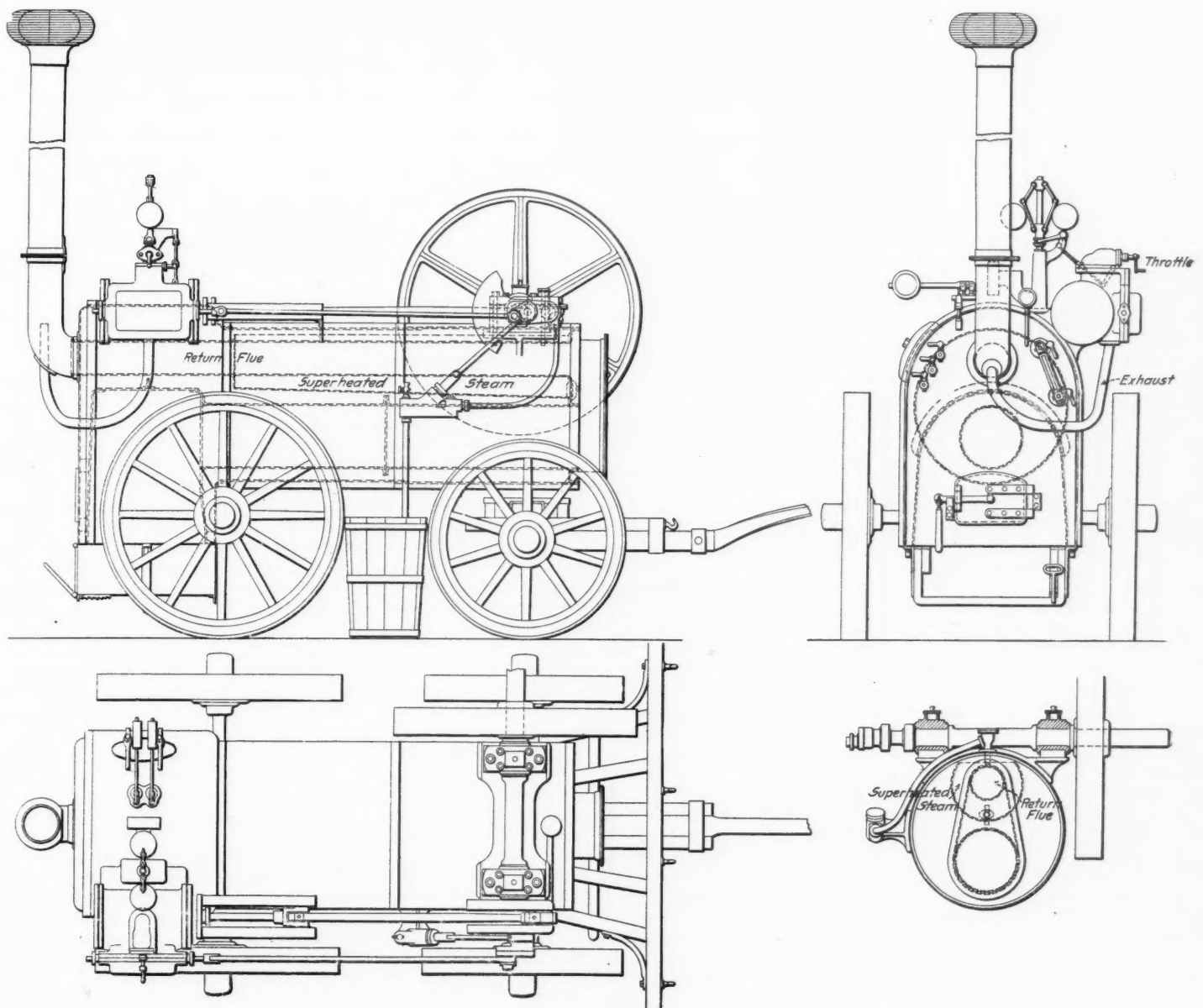


Fig. 13—Return-Flue Superheater of John Haswell; 1862.

of Montety, the experiments made in 1856—not in 1850 as sometimes stated in error—by Hirn, an Alsatian engineer, were principally of interest for the results obtained with a form of superheater better adapted for use in stationary boilers, as in the case of the de Quillacq patent of July, 1849. The Hirn cumbersome superheater in cast-iron was unsuited for regular locomotive practice, but it enabled the publication of data which his predecessors in superheating practice had neglected to record.

From 1855 onwards superheaters and steam-driers became so numerous for locomotive and fixed engines that the interesting stage in their history may be said to have passed, but a few interesting patterns will be selected for mention here. It is a significant fact that as the years progressed designers of superheaters began to place their superheating pipes farther and remoter from the action of the firebox gases.

In the year 1862 John Haswell, of the Privileged Austro-Hungarian Steel and Engineering Works of the State Railways at Vienna, designed the very simple superheater illustrated by the copy of the original drawing, Fig. 12. It will be seen that it is, in reality, a very good form of heat-economizer since even the smokebox is almost entirely surrounded by water; and the heat of the chimney, due both to the waste gases and also to the exhaust steam discharged into it, has to pass through a high steam cylinder, or dome, concentric to the chimney. For a small boiler of locomotive type this simple steam-drier has much to commend it. Incidentally the reader will remark the bed-plate carrying the crosshead and engine shaft for relieving the boiler barrel of all engine motion fatigue and for avoiding injurious expansive movements of the boiler in respect to the engine.

About the same time, though the date is not quite certain, John Haswell produced the simple return-flue superheater for small road engines shown in the Fig. 13. The details are sufficiently clear in the illustration which is made direct from the original. It comprises a 12-in. internal flue between the two flue sheets and a 6 $\frac{3}{8}$ -in. return flue from the smoke-chamber to the chimney, the latter flue being enveloped nearly the whole of its length in an outer casing forming a superheater within the usual steam space of the boiler. The design is extremely neat and, relatively to its steam and superheating surfaces, is suggestive of considerable efficiency. The drawings are dimensioned in English measures according to the practice that was so much observed by English industrial pioneers on the European continent.

John Haswell appears to have been the first engineer in the world to introduce, in 1862, four-cylinder balanced, non-compound, locomotives.

About the same year, in 1863, one of the most interesting forms of superheaters patented up to that time was the invention of Benjamin Crawford, United States, contrived by simply partitioning off the forward end of the boiler barrel, traversed by the fire flues, and reserving it for superheated steam, with due provision of a vertical deflector-plate or baffle in the superheater for diverting the steam to the bottom rows of tubes and thus insuring circulation around all tubes before its passing to the steam pipe at the top of the smokebox. This arrangement is probably the first of that category of moderate heat superheaters of which the best known examples are the Pielock and the Clench.

Since the creation of distinctive types of superheaters by Moncheuil, one of the most frequently employed forms of superheater has been the outside barrel-type, probably for the reason that it has been so much employed, in Europe, as a steam reservoir for increasing the boiler capacity more effectively than steam domes. The example here given, Figs. 6 to 9, relates to a series of four-cylinder express and also series of four-cylinder freight locomotives designed about 1860 by M. Jules Petiet, Chief Engineer of Traction, Northern Railways of France, and built in 1862 by Gouin & Co., of Paris. Similarly to one of the Haswell superheaters, the "steam-dryer" of Petiet is of the return-flue type, but multitubular. The steam-drying tubes of the return-flue were 80 m.m. outside diameter and from 80 in. to 13 ft. in length according to the type of locomotive fitted with the apparatus. Some of these engines are still at work on the Chemins de fer du Nord, but with the outside barrel converted into a saturated steam reservoir, for this railroad, noted for its "de Glehn" engines, is largely operated with half-century old locomotives.

Another example of the reservoir superheater type is that illustrated in Fig. 10, and patented some years later, in 1869, by M. Hittorf, a German engineer resident in Paris and author of an interesting little work on superheating at that period. Placed under the boiler, in pairs, such outside superheaters are to be found in first class modern express locomotives and yield an economy, as compared to similar engines in similar service without them, of 9 per cent. on an average, and without costing a penny for repairs in the first three years of service—1904 to 1907. This latter arrangement has no nearer resemblance to the Hittorf, the Petiet or the Moncheuil superheaters, other than the external barrel for superheater pipes—but the fact shows that such dispositions are not without value.

Car Efficiency.*

MR. BOYD'S ADDRESS.

Nothing less than a determined, spontaneous effort on the part of shippers and railways will evolve a plan by which this problem of car inefficiency can be solved.

Adequate facilities, without which the most reasonable of rate adjustments is rendered more or less ineffective, must now command our attention. Car efficiency, therefore, is a leading unsolved transportation problem. No feature of transportation is so vital to the shipper as ample car supply and rapid service; no cause can be held so responsible for his loss when those facilities are denied him. He who relies on railway service cannot cease operations and view with indifference deficient transportation. There is no middle ground; he must go forward or drift backward; show a profit or take a loss. His duty to himself, and to others, is not only to refrain from unjust detention of cars, but also to demand from the carrier efficient service.

* * * Only two questions need be considered: (1) Are transportation facilities sufficient to present needs? (2) Are we obtaining from the facilities available all that they are capable of giving?

To the first question answer has already been made by those high in authority, who say that railways in their development are far behind the commercial world. Here it would seem the shipper scores the first point, for with this admission we may logically infer that commerce in its superior growth has naturally developed its own facilities correspondingly to take care of such increase. This acknowledgment is not made with respect to cars and engines solely, but as to other means of transportation as well. Here another point is scored, for in this delinquency we find one great cause of the failure to promptly move loads when tendered. As to the direct question, "Are we getting all we can from the means at hand?" we all find common ground in the negative. Who is responsible? Again we stand together. Then, what is the direct cause? This: First, unnecessary delays of cars; second, insufficient loading; third, delays in transportation; fourth, unnecessary work and consequent inefficient service at terminals, resulting from the continued use of methods long since outgrown.

In discussing the first of these features we must divide shipping interests into two classes: Those who by the investment of capital or otherwise have provided themselves with ample facilities to conduct their business; and those who by their wits and shrewdness have prevailed upon our railway friends to grant special privileges at out-of-the-way places where no means are provided for handling. This results in pressing cars into service as warehouses. With this latter class we have nothing in common; for their existence the railways are primarily responsible, and the railways must find and apply the remedy. We protest strongly against the disposition of carriers to generalize on the sins of the public in respect to car abuses. We object to their taking an incentive from the omissions and acts of this second class to saddle the responsibility for abuses on those who, having pursued a wiser course, are made to suffer in common with the carriers.

With regard to those who have warehouses of their own, it will not do to say out loud there have been no delays. There have been many and they are to some extent indefensible. Convenience often leads those possessing means for prompt unloading to prefer the use of the car instead. This is unfair not only to the carrier, but also to others awaiting equipment. The percentage of delay from abuses of this kind is small when compared with the total. * *

We often hear the expression that no one should purchase more than he can accept and handle promptly. No exception can be taken to this. But is that practice generally followed? What protection is there in so limiting purchases? The most carefully laid plans to order as facilities will permit are neutralized in times of congestion by failure of carriers to perform their duty in delivering the property promptly as ordered. No one can be expected to furnish facilities that will meet the most exacting demands, due almost entirely to slowness of others. No one expects carriers to have at any or all times a car supply equal to the greatest demand, nor in justice can the consignee be considered differently; both are subject to human limitations. What, then, is the result? Cars started in time and at regular intervals are delayed and days will pass with little or no delivery, to be followed by a deluge of deliveries and demands from carrier to accept, unload or pay the penalty. No account is taken of the loss suffered by the consignee from idleness. The answer of the carriers is that they are not bound to place freight at destination at any given time, losing sight of the fact that reasonable dispatch is imposed upon them by law. No one can object to economy in operation, since the greatest saving obtained from any given factor of transportation is a benefit to all; but economies that lean all to the railway's side at the expense of the public are false and unfair. Happily, such "economy" is on the wane.

*Addresses before the Traffic Club of Chicago, Oct. 25, by E. B. Boyd, Manager of the Transportation Department, Chicago Board of Trade, and Arthur Hale, Chairman of the Car Efficiency Committee of the American Railway Association.

Again, the shipper is often called upon to stand between carriers disputing with regard to the use of cars in times of scarcity, a practice altogether too prevalent. It has become a recognized practice for carriers to take possession of all cars in sight, regardless of ownership or from whom received, and apply them to orders for empties. Shippers availing themselves accordingly are met with a protest from the owner, the intimation being given that a repetition of the offense will prevent further deliveries from the complaining road. To ignore this protest means punishment; to comply means loss. Last winter afforded many examples—which doubtless will be repeated in the near future—in which shippers who, in their efforts to act fairly and while suffering for empties, found that as soon as a foreign car was unloaded by them it was not returned, but delivered to others, often their competitors, located on the same switch road. But this was not all. Notice to consignees on connecting lines was given by some railways that none of their cars, whether received under load or set in as empties by the line on which they were located, must be used or penalty would be inflicted; to be followed, on the other hand, by notice from switch road that failure to use cars set in would operate as a cancellation of a corresponding number of orders. Thus, "damned if you do and damned if you don't."

Inasmuch as the two interests—carrier and patron—are interdependent, is it not better to recognize that the impairment of one reacts to the detriment of the other?

There are too many cars traveling over the country under one-half or three-quarters load, even giving due consideration to conditions. It is not long since the maximum capacity of cars was 15 or 20 tons, and small dealers adjusted themselves accordingly. Units of sale as to car lots were based upon the prevailing carload minimums until it became a custom; but, as progress was made, and cars increased to 20, 25 and 30 tons capacity, the retailer and the consumer did not keep pace, nor have they caught up. The manufacturer and large distributors, on the other hand, have been alive to the conditions and stand ready to utilize to the full extent large cars, but are prevented from doing so by failure of the purchaser to co-operate. The public should realize that the carrying capacity of the railroads has been practically doubled in the last ten years, and at a great cost, to meet the rapid increase in commerce; and it is unjust and almost criminal for one portion of the public, for selfish reasons and through false ideas of economy, to deprive the other part, and the carriers, of the benefits of progressive action. If commerce has increased so rapidly, the consignee in consuming territory must have handled his business with woefully inadequate facilities, and this has been reflected in the insufficient loading of cars.

Prompt and regular service from initial point to destination must precede the quick disposition of freight at terminals, especially the larger ones. The delayed freight after arrival is thrown at the consignees in bunches, temporarily blocking not only his facilities, but also the carrier's, thus causing delays to multiply upon themselves. This is not an exceptional condition, as some would have us believe. It is common, it is here to-day; later on it will play an important part in the tabulations of the railways as to the idle time of equipment, probably finding its way eventually to the shipper's door.

In the unnecessary service at terminals we find the greatest source of our troubles and also one of the greatest fields for improvement. It can be said without exaggeration, I think, that there is wasted at terminals in money and energy from 25 to 40 per cent. through the loss of the service of cars, owing to the demand for the return of empties and to the unnecessary switching incident thereto. In consequence of misuse of cars the dreaded embargo notice appears and car inefficiency is started on its way. Freight in carloads on arrival at destination is refused delivery to owners located on connecting or switch lines. Cars accumulate until the dispute between carriers is settled, and then go forward after delays of from two to ten days. This may be justified, but it means, nevertheless, loss of utilities, and a maximum of annoyance and an expense to owner of the property, with minimum good to the carrier.

Great evils result from the enforced return of empties and the extra switching required. Every car returned empty means time wasted; and just now time is money. From two to six days is usually consumed. Within the past two weeks in a number of cases three and as many as seven days have been consumed in delivering to consignee where only the initial road was concerned. The consignee who receives also ships, and had he been permitted in the first instance to use for the outward movement the car he made empty, there would have been saved another day or two lost in supplying an empty to take its place. All this is accomplished at an expense in switching for which the carrier, as they would have us believe, is poorly paid. Very often this expense is included in the rate. It is an outlay in money or services that with improved methods would be saved.

Another source of inefficiency and of great annoyance and expense to owners of freight is found in the strict enforcement

of arbitrary and exacting rules governing cars in bad order. Cases of delay from one to ten days are known, and sometimes 30 days. This condition arises from the too close enforcement of rules. Faulty rules as to demurrage are also responsible. To require a consignee to unload within a given time after notice of arrival imposes the obligation upon the carrier to make a proper delivery. This the carriers do not do. The latest cars are delivered first, while the earliest ones are held back. The consignee, to protect himself, exercises his right to call for the cars in the order of their arrival, that he may unload within the free time, and the carrier is at the expense of shifting trains backward and forward to get the cars desired. Is this not a careless waste of energy? Why make rules which in their operation must become boomerangs? Here is an opportunity for reform.

The Remedy.—We support the demand so persistently made by the railways for a number of years, namely, that those who require transportation should provide themselves with facilities adequate to their needs. Cars are built to transport, not to store, and if some of the good advice the railways have been giving the public in this respect were followed with regard to company material, especially coal, a great many more cars would be available to commerce.

To the retailer and heavier consumers: Increase the load in cars, increase your facilities, make your purchases conform to the new order of things, or expect to make your contribution in another form—increased cost of transportation.

High speed is not necessary, but regularity of service is. The feast and famine practice of delivering freight can have but one result—congestion. Avoid this and give shippers an opportunity to do their best.

Last, but not least, permit cars, without regard to ownership, to go to any place served by a railroad. Eliminate the delays that now attach to every car because of the name painted on its side. Handle cars on the line of least resistance and better results will follow. So long as a consignee unloads a required number of cars a day, why should it be any particular car first? The "average plan" of assessing car service (demurrage) would here quickly demonstrate its superiority over present methods. The cry is for uniformity, but what shall be the standard? If free time is to be determined by the needs of the smaller communities, where conditions under which traffic is handled are dissimilar to those at greater centers, then injury and injustice is done the many in the interest of the few. If, on the other hand, the needs of the larger terminals, where they receive and ship daily train loads of freight, is to determine the standard for all, then the door is open to abuse by giving those who do not require it free time in excess of their needs.

Co-operation as a means of settlement is the demand. Mutual consideration is essential. It is only by placing ourselves in the other fellow's shoes that we can properly determine our duties. But are we doing it? Is there not a disposition all too prevalent to consider as unfounded and worthy of little attention, even in advance of investigation, complaints made in good faith?

Is it not now time to recognize the palpable fact that the day of car aristocracy is passed? Whether bearing the name of the Pennsylvania Company or the Arcadia & Betsey River Railway, the effect is the same; it is but a car; it is built to carry freight and the freight should be that which could be secured the quickest and with a minimum cost in switching. Car efficiency of that character means an increase of equipment without the addition of a single car.

MR. HALE'S ADDRESS.

I understand I am to speak for the railroads. It has been so unusual for anyone to speak for the railroads in the last year or two that I fear we are all a little out of practice on this subject. We have been, however, so very pleasantly reminded to-night by Commissioner Clark that some can speak for the railroads and speak very well; and we were so pleasantly reminded in this city, not so long ago [by Mr. Mather] that we still exist, that I take up the subject with less diffidence than I might otherwise have done.

The term "car efficiency" is a new one—less than a year old. It is a good term because it needs no definition and no explanation. It was invented by our friend, Mr. Allen, secretary of the American Railway Association, the father of standard time.

As has been said before, the highest car efficiency can only be obtained by co-operation among the railroads, and between the railroads and the public. Much, however, can be done by the railroads individually, and much is being done. Many of the railroads which need cars the most are buying at an unprecedented rate. A shining example of this is the New York, New Haven & Hartford, which is doubling its equipment this year. Again, other railroads are doing better work with the equipment they have. One during the last year has increased the average movement of its cars from 29 miles to 36 miles per day—an increase of 25 per cent. This is the Chicago, Burlington & Quincy. Other roads have done almost as well in this particular.

The railroads, in conjunction with each other, have also taken action to improve the efficiency of cars. As I need not tell you, they have doubled the per diem rate between themselves, with the

objects of stimulating the building of new cars, improving the movement of cars, and of returning them to their owners. The railroads of the country have over 700,000 of their cars on each other's tracks, and the payment for the use of cars is something like \$350,000 a day. Payments this year will be \$60,000,000 more than last year, and we feel confident that in their efforts to gain or save, as they can, considerable parts of this \$60,000,000, the railroads will improve the movement of cars. Improvements are being made as well in the relations between the Trunk Line railroads on the one side, and the Belt roads, the Switching roads and the Industrial roads on the other. Too often in the past the division of responsibility for car delay as between such roads has been ill-defined, resulting in considerable delays to cars. Problems involved in properly determining such relationships are difficult, but they are being handled with diligence, and progress is being made.

And now we come to the relations of the railroads with the public and the industries. Such concerns load and unload cars, and therefore have it in their power to affect the car efficiency of the country by their quick or slow work. If the public were to change their practice 10 per cent., for the better or worse, it would mean that there would be 100,000 or 200,000 cars affected, and the car efficiency of the country would be changed correspondingly for the better, or for the worse. The demurrage rules have been devised, not for the immediate profit of railroads by the collection of moneys, but for the reduction of car delay. As I have said in another place, every dollar collected for car service is a misfortune, and the total amounts of car service earnings are simply measures of the extent of the calamity.

From \$20,000 to \$25,000 are collected daily in the form of car demurrage. This means that there are from 20,000 to 25,000 cars not available for loading, which might be available. The total shortages in the country are now little more than 60,000 cars. If we could supply 25,000 cars more, daily, to be loaded with freight, these shortages would soon be wiped out. Whenever an industry handles a car inside the free time it is helping the general situation. If it handles the car in half the free time, it is helping the situation still more.

There are something like forty different sets of car demurrage rules in effect in different parts of the country. The American Railway Association has had prepared, through one of its committees—with the help of a suggestion of the Interstate Commerce Commission, and with the hearty concurrence of the Car Service Managers—a set of car service rules, which it will consider at its meeting in New York next week. This set of rules is intended to embody the best practice that can be found. It is quite possible that some of these rules are so stringent that they cannot immediately be adopted in all parts of the country. This is felt to be the case by a number of our most important shippers, and I have been asked to give my views on this subject here. I have been reminded that I have been a consistent advocate of the so-called Pittsburgh Car Service Rules and have helped to secure their adoption, not only in Pittsburgh, but also through Ohio and the various other places where there are similar industries. It is true that I have done this, and that I think the Pittsburgh rules were better adapted for such trades last year than any other rules I know of. The Pittsburgh rules are better adapted to-day, in their entirety, for such industries than any other rules I know of; but I do not mean by this that the Pittsburgh rules are the best rules that can be devised for the whole country, any more than I think the new rules are the best that can be devised for every city in the whole country. My opinion is that the new rules, approved by the Committee on Car Service of the American Railway Association, are better adapted for the larger portion of this country than any other rules I know of, and that they can be adapted—with very few modifications—for immediate use all over the country and even in Pittsburgh.

Now, gentlemen, this is all I had intended to say, but there have been some things said here that make me want to say something else. Mr. Boyd, for instance, has said a great many things about the railroads which are true, and he has given us some excellent recipes for improvement.

Two of his recipes are: first, that the railroads improve their facilities, and, second, that the railroads give regular time, as I understand, to all classes of freight. Two good recipes, but they cost a great deal of money and we do not know where to get it. All of us know that improved facilities cost money, that nothing costs more money than interfering with the face of Mother Earth and buying steel rails. But the cost of regular time for all freight is more than is fully realized by the shipping public. Mr. Boyd, having said, and justly, that the good shipper must not be judged by the bad shipper, will allow me to say that the good railroad must not be judged by the bad railroad. Not all the railroads in this country do all the awful things he has spoken of. I am afraid some of us do, but all of us do not; and I think it can be justly said that high-class freight moves in this country, on most of the roads, with fairly reasonable time, and indeed, with better time than is absolutely necessary. But the low-class freight does not move

regularly, and the only reason why it does not is that it would cost enormously to move it regularly. To move all your freight regularly means to clean out every yard every day, and that means to run a light train from every yard every day. There is not a railroad manager in this room that has money enough now to clean up every yard every day. Much has been said about the railroads guaranteeing time on all freight, on low-class freight. To do that will greatly increase cost. The rate per ton per mile on coal, grain and flour, on our road [B. & O.] runs mighty near three mills per ton per mile. I would not undertake to give absolutely regular time, even slow time, on freight that only pays three mills per ton per mile. When you are ready to pay more, the railroads will give you regular time on low-class freight as well as on high-class. Another thing in regard to the bunching of freight on arrival: remember how often freight is bunched in shipment. That is something that must be considered, too.

I want to thank both Mr. Bentley and Mr. Boyd for what they have said about the common use of cars. That is a question which you shippers really feel more deeply than the railroad manager does. I want to say as to our present attempts, futile as they may seem, in regard to the ownership of cars, that after a good deal of experience with railroad men in urging the common use of cars, as I have been constantly doing for the last ten months, publicly and privately, I have found such difficulties, such natural difficulties, that I look to the industries of the country, to the shippers of the country to bring that change about, if it is brought about shortly.

The common use of cars is unpopular with railroad men, and very naturally so. The railroad that has not the use of all its equipment, the railroad that owns 20,000 cars and has only got 10,000 cars on its line, does not want to go into a pool; that railroad wants the right of the owner of the car recognized. Anyone can see that. Suppose, for instance, that all of my cars are away, and in their place I have only half that number of foreign cars. I do not care about a pooling scheme; I want my rights as owner recognized.

Now, take the other fellow, using the other man's cars, the man who owns 20,000 cars and uses 30,000 cars; that man does not want a pool, because he wants the 10,000 cars that do not belong to him. When you undertake to advocate pooling to the railroad men, their individual point of view, their duty to their stockholders, makes them very careful about going into a pooling scheme. I am not opposed to car pools—they are right; Mr. Bentley is right, and Mr. Boyd is right. But it is a very difficult thing to get the railroads to agree to a pool in the first place, and it will be very much more difficult to carry out the pool afterward.

That is something I would like to speak to you about a little further. When I was with the Pennsylvania Railroad, we used to say that if you let the cars alone they would all go to Jersey City, and it looked so, because the traffic on that road practically all took an eastward course. When I was in the transportation department we were always hauling empty cars out of Jersey City—sometimes we could not haul them fast enough, and we would have a blockade there. You will find, on every road, the trend of traffic in one direction, and there has got to be some power to take the empty cars back to balance the equipment up.

Just what kind of power can do that as between the railroads, I do not very well know. I think that a very much higher per diem rate to be imposed on the roads that are using more cars than they own, would work. I think so, and the American Railway Association has said they thought so, but I have never been able to get enough roads to come into a plan for a common use of cars to make it go. The sentiment must be worked up, it seems to me, by you gentlemen who feel the pinch of it every time you have to give up a western car when you have a load for the west.

If we could devise and get adopted an equitable scheme for the common use of cars, I believe we might make enough money out of it to give more regular movement to low-class freight.

Rensselaer Polytechnic Institute.

The Rensselaer Polytechnic Institute, Troy, N. Y., has opened with the largest freshman class in its history, numbering about 270. This makes the number of students in the school about 600. Courses in mechanical engineering and in electrical engineering, leading to the degrees Mechanical Engineer and Electrical Engineer, have been inaugurated this year. These courses will be four years long and will be very general engineering courses. The first two years will be nearly identical with the course in civil engineering. This makes four different courses now given at the institution. The fourth course leads to the degree Bachelor of Science and has a great deal of chemistry in its curriculum.

Plans for the new Russell Sage Laboratory are about ready. This building will contain the mechanical and electrical engineering laboratories. It will be 244 ft. long, 80 ft. wide and five stories high. It will be finished in 1908. The boiler house, with a capacity of 800 h.p., is now being built and will be finished this year.

Opening of the Washington Union Station.

The first regular passenger train to use the new \$20,000,000 Union Station at Washington, D. C., entered the station over the Baltimore & Ohio tracks early in the morning of Oct. 27. The Pennsylvania will not abandon its Sixth street station for some months. The new terminal was built by the Washington Terminal Company, owned jointly by the B. & O. and the Pennsylvania. In addition to these two roads all the roads entering Washington from the south will run trains from the present tracks on Virginia avenue through the double-track approach tunnel under Capitol Hill into the station. These include the Southern, Chesapeake & Ohio, Atlantic Coast Line, Seaboard Air Line and the Richmond, Fredericksburg & Potomac.

The station building fronts on a wide plaza and faces the Capitol and the new Senate office building. It is of white Vermont granite, 632 ft. long, 210 ft. deep and 120 ft. high in the center. The passenger concourse between the station building and the train platforms is entirely roofed over and has an area of 97,500 sq. ft. There are 33 tracks in the terminal, each 1,200 ft. long, giving a capacity of 66 trains in the station at one time. The platforms are protected by inverted umbrella sheds.

The terminal express building, north of the station, is 420 ft. long and 60 ft. wide. A large power house and a 25-stall round-house have also been built near the station. New freight houses are under construction at New York and Florida avenues. The house tracks will hold 200 cars and the team tracks adjoining will hold 450 cars.

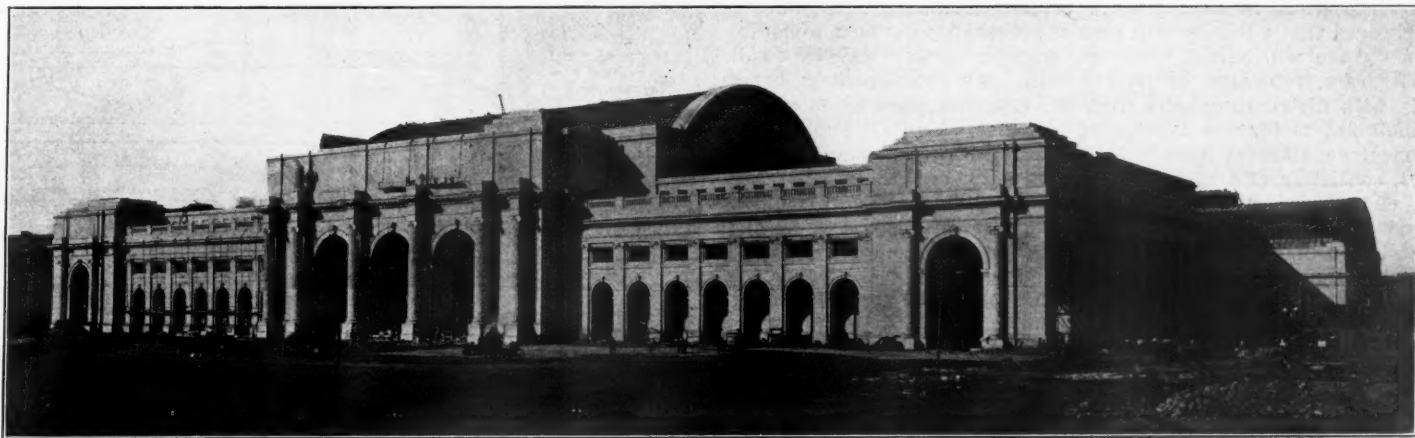
The terminal has been built under the supervision of D. D. Carothers, Chief Engineer, B. & O., and W. F. Strouse, Assistant Engineer, Washington Terminal Co., representing the B. & O., and

without undue haste, and still with a balance of at least 50 per cent. of his time remaining available for patrolling and inspecting.

* * * Bond wires and other track connections frequently break apparently from no other cause than the vibration from passing trains. Inspection will discover these, and no failure will have resulted ordinarily if the construction has provided for double connections at points where breakages cannot be avoided and must even be expected.

We question the wisdom of establishing a fixed schedule of daily duties to be performed by the maintainer. Much the greater part of maintenance work is irregular, and best results will be obtained by allowing maintainers to carry out their work much on their own initiative. It is perhaps too much to expect all maintainers to become capable to take part and adjust a relay, but there is no reason why some of them should not attain proficiency and be permitted to do such a thing when necessary. In any event they should not be discouraged by peremptory orders forbidding their opening a relay.

The renewal of track batteries should not be determined entirely by the condition of the battery, and should not be at the end of an arbitrarily fixed period, as it will vary at different times depending on the cross resistance of the track circuit and other local conditions. The battery will require an inspection about once a week to insure that all connections are tight and that the general condition of the battery is good. Zincs weighing less than 1 1/4 lbs. and coppers weighing more than 2 lbs. should be scrapped. With glass jars there is a difficulty in preventing breakages by temperature changes and this has suggested the use of one glass and one earthenware jar in a battery. The earthenware jar will not break and will hold the track circuit alone should the glass jar break. The glass jar will serve as an index to the condition of the bat-



The New Union Station at Washington, D. C.; Opened Oct. 27, 1907.

A. C. Shand, Chief Engineer, and Robert Farnham, Assistant Engineer, representing the Pennsylvania.

For complete descriptions of this terminal improvement work the reader is referred to the *Railroad Gazette* of Dec. 4, 1903; Jan. 15, 1904; June 3, 1904; Nov. 11, 1904; Aug. 31, 1906, and April 5, 1907.

Maintenance of Automatic Block Signals.*

Your committee has had in mind an installation of electro-motor signals operated by the ordinary track circuit system. On a road operating under a divisional organization, there should be a Signal Supervisor on each division, reporting to the Division Superintendent and having charge of all signal maintenance matters on the division. The efficiency of signal maintenance will depend to a great extent upon the degree to which he devotes his attention to personally inspecting in detail the work of those under him. The division should be further divided into districts 100 to 150 miles in length, each in charge of a district foreman reporting to the Signal Supervisor and directing the work of maintenance and repairs on his district. * * *

The chief factor in successful maintenance then remains in intelligent inspection—daily on the part of the maintainer, and as frequently as possible on the part of his superiors. Conditions will be still further bettered by a regular inspection of details by some representative of the Signal Engineer's office. Close inspection in anticipation of trouble is the most important duty of a maintainer.

For the use of the maintainer in his daily rounds, we recommend a light motor car, not with the idea of gaining speed, but to relieve him of much of the hard labor expended in traveling against winds and ascending grades. The maintainer's fixed duties should not be so great as to preclude the possibility of his accomplishing all

tery, but probably this indication should be checked by a Baume hydrometer test of the earthenware cell. The prevention of freezing should not be a maintenance matter at all but should be provided for in construction.

Bond wires and other track connections should be closely inspected at least twice a month. At road crossings and station platforms the character of construction should be such as to make this necessary less often—probably not oftener than twice a year. Switch boxes should be adjusted to close the circuit when the switch has been opened 1/4 in. and throughout the remainder of the stroke. They should be closely inspected at least once each week and tested first by slowly opening the switch noting at what point the box operates, then opening and slowly closing the switch to note at what point the box ceases to operate. Next by closing the switch with moderate pressure against a stop 1/4 in. in thickness, placed between the point and stock rails, to test for lost motion.

Experiments to determine the effect of Burnettized ties on track circuits are not quite complete, but it is probable that the result will be to make it necessary to reduce the length of track circuits. A form of ballast section which will leave the rails entirely clear of the ballast should be adopted within block signal limits to avoid circuit troubles during wet weather.

Modern glass-enclosed relays very seldom require adjusting. They should be kept sealed by the district foreman, and when necessary to break the seal for repairs of any description, all facts in connection with the matter should be given to the district foreman for transmittal to the Signal Supervisor. Comparatively inexperienced maintainers should not attempt to make such adjustments, but should replace the relay with a spare one provided for that purpose and notify the district foreman. Each maintainer should be provided with one spare relay of each type used on his section.

Within the experiences of the members of this committee it has not appeared necessary to use an additional relay of high resist-

*Extracts from report of Committee No. 2, Railway Signal Association.

wheel-fit, diameter and length of gear-fit, the gear keys and the diameter of the motor-fits. The dimensions recommended by the committee are desirable and acceptable to the manufacturers of the different parts of the equipment. Their adoption will result in eliminating a great variety of dimensions of these parts. This lack of uniformity in the past has worked a particular hardship, not only on the manufacturers, but also upon the companies operating the equipment. The motor builders will now be able to arrive at a uniform gear practice.

It is further recommended that for motors not to exceed 100 h.p., a 3-in. pitch gear with 5-in. face be adopted as standard; and that motors exceeding 100 h.p. should have a 2.5-in. pitch gear with a 5.25-in. face.

Journals and Journal Bearings.

For journals and journal bearing keys the committee recommends the use of the four sizes adopted by the Master Car Builders' Association as standards. These are the result of years of experience in equipments of similar character and generally familiar, and are specified in reports of the proceedings of that association.

Journal Box.

In connection with the axles already recommended, the committee recommends the adoption of standard journal boxes for each of the different journals recommended, with two designs for the tops of the boxes to accommodate the two styles of trucks generally used in electric traction equipment. The interiors of these boxes are arranged to accommodate the journal bearing keys referred to above and will be subject to the test gages in common use for journal boxes of this character. (The proposed 5-in. x 9-in. box only is shown.—Ed.)

Brake-Shoes, Brake-Shoe Heads and Keys.

This feature of the equipment most readily permits of standardization and the results obtained therefrom, both mechanically and commercially, will be most desirable. At the present time there are innumerable styles and patterns of brake-shoes and brake-heads in use throughout the country, many of which vary but slightly from the recommendations which the committee herewith submits.

For wheels having a tread 3 in. wide and over, the committee recommends a design of brake-head and shoe (see Figs. 3 and 4), both of which are interchangeable with those in general use in steam railroad practice. The brake-head recommended is adapted to both the flanged and unflanged shoes. The unflanged shoes to go with this head are reversible on their own wheels, and the flanged shoes may be reversed by changing the shoe from end to end on the brake-beam.

To accommodate wheels in service, with treads narrower than 3 in., the committee recommends the brake-head and shoe illustrated in Fig. 5. This head is adapted for use on any of the narrower tread wheels, viz., those less than 3 in. wide. The brake-shoe can be used either flanged or unflanged, the unflanged shoe being reversible upon the same wheel and the flanged shoe reversible by changing it to the other end of the brake-beam, thus requiring but one pattern of brake-shoe for all equipment which will be standardized with this brake-head.

No attempt has been made at this time to suggest a standard for the brake-head hanger arrangement, as the patterns submitted are simply for the brake-shoe attachment. For the brake-head shown in Figs. 3 and 4, it is intended to use the brake-shoe key now in general use.

Standard Section of Tread and Flange of Wheel.

The investigation by this committee of the various types of wheels in service on electric roads throughout the country showed that there is a very wide variation of wheel sections in use, especially as regards flanges and treads, and it was almost impossible to select one wheel which would meet all the varying conditions. It also showed conclusively that wheels of a considerably narrower tread than the increased weight of the equipment requires, are being operated. The committee, therefore, recommends as standard for street and interurban railways as far as it can be applied, a wheel tread and flange contour which conforms to that shown in Fig. 6 and indicated as wheel A, this wheel to have a tread 3 in. wide and a flange $\frac{3}{8}$ in. high and $1\frac{3}{16}$ in. thick at the throat. It is the opinion of the committee that this wheel tread and flange can be applied with little difficulty to a great majority of the roads forming the association.

A number of roads are using wheels with a tread 3.5 in. wide for combined city and interurban work, and there is a decided tendency in this direction. This wide tread assists in carrying the load across special work without running on the flange, and avoids the necessity for flange bearing on the special work. The committee therefore also recommends wheel A with the width of tread increased to 3.5 in. for interurban work, and also for city work where it can be used. It is especially desirable to work toward the general adoption of wheels having this tread.

The committee recognizes the fact that local conditions on many

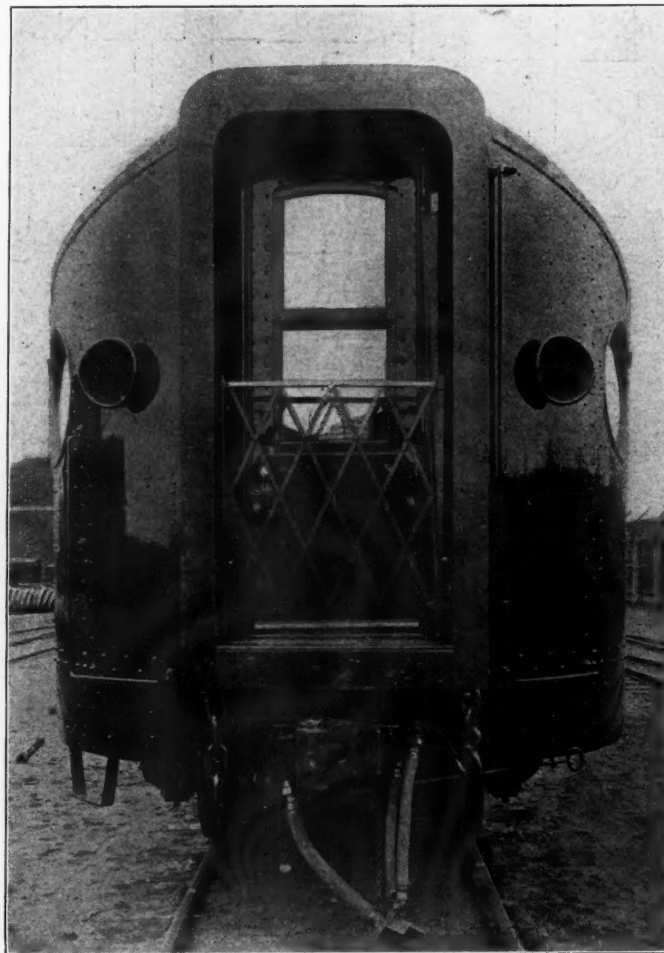
roads are such that it will be difficult for a number of years to operate a wheel of the dimensions represented by wheel A. To meet these conditions the committee recommends wheel B (Fig. 6), with a tread of 2.5 in. wide and a flange 0.75 in. high, this flange to have the same general dimensions as wheel A with the exception of the height above the tread line.

In mounting and gaging wheels it is understood that the gage line is at a point on the flange 0.25 in. above the wheel tread, and the committee recommends that the wheels be gaged 0.25 in. narrower than the gage of the track, the track gage being measured between points 0.25 in. below the tops of the rails.

Union Pacific All-Steel Fireproof Passenger Car.

The accompanying photographs show the new all-steel passenger coach which has just been completed at the Omaha shops of the Union Pacific. It is quite similar in general appearance to the gasoline motor cars of this company and it is therefore a wide departure from conventional designs. The length over vestibule diaphragms, 68 ft., is the same as the present standard 60-ft. coach, and only in this respect does it bear any similarity to equipment now in service. A decrease in height from rail to roof of 24 in. is a noticeable change from the dimensions of the regular equipment.

The underframing is composed of two 12-in. I-beam center sills, spaced 16 in. apart, and 6-in. x 3-in. x $\frac{1}{2}$ -in. angle-iron side sills, all securely fastened by cross-ties, needle-beams and diagonal bracing. The 12-in. center sills are intended chiefly to transmit the



End View of Union Pacific Steel Passenger Car.

buffing and pulling stresses, and in reality do not carry any load, as they themselves are carried by the sides of the car, which are of girder construction. The double body bolster, sills and end bracing of the underframe are made of a one-piece steel casting, 11 ft. long by 9 ft. 9 in. wide, weighing 3,700 lbs. This cast-steel end construction greatly reduces the number of parts.

To the top of the underframing is riveted a bottom floor of $\frac{1}{16}$ -in. sheet steel, forming a fire protection from below. On these steel sheets is a layer of $\frac{3}{4}$ -in. hair-felt and on top of this is a flooring of fireproof composition in pressed sheets, 3 ft. by 4 ft. and $\frac{1}{2}$ in. thick, laid on nailing strips $\frac{3}{4}$ in. by 2 in., embedded in the hair-felt. The whole floor construction is securely bolted together by small stove bolts, the heads being let in flush with the top of the floor.

The side posts and carlines are integral, being one continuous piece of 3-in. channel iron, bent to a U form, inverted, extending

from side sill to side plate and forming the contour of the half-oval roof. To these channel-iron posts, which are formed with the flat side outward, is riveted the $\frac{1}{8}$ -in. steel side sheathing, which together with the posts is riveted to the angle-iron side sills. The steel sheathing extends from the bottom of the side sills to the top of the 4-in. channel side plate, forming a deep, substantial girder, which is stiffened additionally by diagonal braces below the windows and riveted to the sheathing. Holes 25 in. in diameter are cut out of the sheathing for the windows.

ceiling is $\frac{1}{8}$ in. thick. All are of the same fireproof composition as the floor.

The walls of the car are only 2 in. thick from outside sheathing to the finished surface of the interior wall, a reduction of $3\frac{1}{2}$ in. from present designs. This allows an increase of 7 in. in the width of the aisle.

Comparatively little wood is used in the construction of the car, there being about 200 lbs. of small filling blocks only. All mouldings, etc., are made of fireproof material.

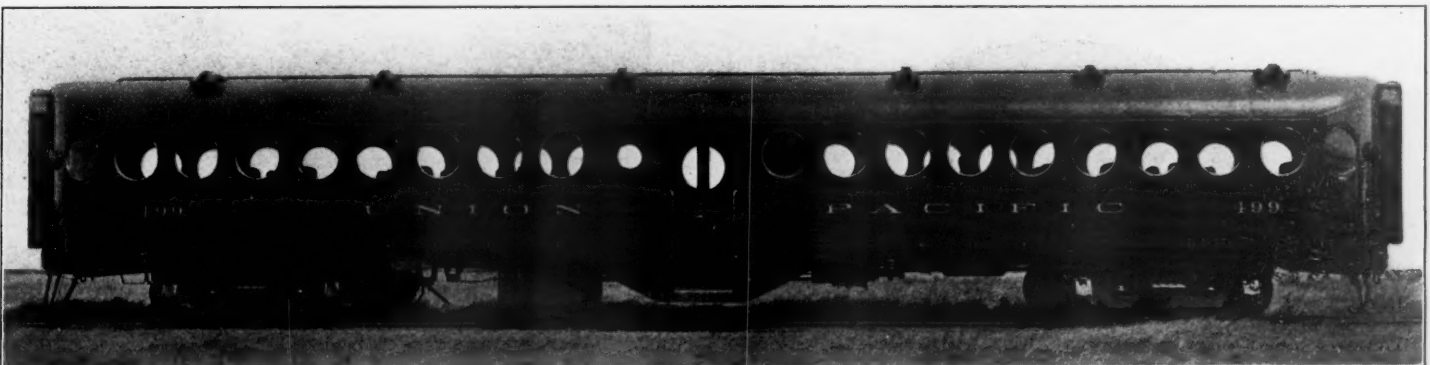
Particular attention was given to the ventilation and fresh air supply. Cottier suction ventilators of an improved design are placed along each side of the center line of the car. Fresh air is admitted at the ends of the car, about 5 ft. from the rail, at each side of the door, through intakes 12 in. in diameter, covered with a fine brass netting. It passes downward to an air-tight galvanized sheet-iron box beneath the car containing two sets of removable dust-collecting screens set vertically. The purified air passes upward to the inside of car through a galvanized sheet-iron duct which runs along the sides of the car with perforations at each seat for discharging the air. The steam heating pipes are placed outside of this air duct to heat the incoming fresh air to the desired temperature. The "Vapor" heating system of the Chicago Car Heating Co. is used. The amount of fresh air admitted to the car is regulated by dampers in the intakes.

The car has an axle-light electric system. There is an 8 c.p. lamp, with frosted globe at the side of the car at each seat just above a seated passenger's head.

The drinking water is contained in a large, flat, galvanized iron tank, set vertically, back of a removable partition at the center of the car. From this tank, which is filled by a hose fastened to a connection at



Interior of Union Pacific Steel Passenger Car.



New Steel Passenger Car; Union Pacific.

The usual form of square wooden window sash, and the gothic sash above, have been discarded for a circular aluminum sash with a 24-in. glass. This metal sash is provided with a half-round rubber gasket and forms a weather and dust proof window, far surpassing the best type of double sash now in general use. These circular windows are similar to ship porthole windows, being hinged at the top. They are opened by swinging upward toward the ceiling, where they are secured by a special catch.

The oval form of roof does away with an upper deck. It has been a success on the gasoline motor cars, affording extreme lightness, strength and low cost of construction, with simplicity and beauty of design.

The interior arrangement likewise differs considerably from present designs. The four entrances, steps and end vestibules, found in the ordinary coach, have been discarded and a single vestibule at the center of car, with an entrance on each side, has been used instead. This style of entrance proved very satisfactory on the motor cars. Both ends of the car are rounded to eliminate the danger of telescoping and to decrease air resistance. The usual end doors have been retained in order to allow a continuous passage through the train.

The toilets, two in number, are placed at diagonally opposite sides of the steps, at the center of car, and have an efficient system of ventilation and fresh air supply. Standard reversible plush coach seats have been placed in the car temporarily. Fireproof seats are to be used, however, as soon as they can be secured from the makers. All partitions and inside walls of the car are $\frac{1}{4}$ in. thick and the

the side sill of the car, the water flows through a coil of pipe in an ice box below the car, to the water alcove at the center vestibule.

The principal dimensions are:

Total weight	89,250 lbs.
Length over vestibule diaphragms	68 ft.
Height, rail to roof	12 ft. 1 3/4 in.
Height, floor to ceiling	7 " 8 1/4 "
Width, inside at wainscot	9 " 5 1/2 "
" of aisle between seats	2 " 5 1/2 "
" of car over side sills	9 " 9 1/2 "
Roof sheets, galvanized iron	1/16 in. thick
Side and end sheathing, steel	1/8 in. thick
Seating capacity	78
Trucks	Four-wheel cast-steel

The car was designed and built under the supervision of W. R. McKeen, Jr., Superintendent of Motive Power and Machinery of the Union Pacific.

It is reported that the Siemens-Halske Co., after consultation with the railroad administration, has submitted plans for a new underground electric railway through Berlin. It is to connect the Potsdam station with the Stettin station, thus furnishing communication between the southwest and the north of the city. The road is to be double track and standard gage, and of such construction that it can be used by the standard rolling stock of the steam railroads. Besides furnishing through connection for trains from the south to the north and vice versa, the local passenger traffic of the city is to be taken care of by trains running with $2\frac{1}{2}$ minutes headway. The diameter of the tunnel in the clear is to be 27.9 ft.; height, 14.4 ft. No curves are to have less than 482 ft. radius,

Causes of Defects and Failures of Steel Tires.*

BY GEORGE L. NORRIS, M.E.
Chemist, Standard Steel Works.

(Continued from page 500.)

The heat treatment of any piece of steel, as shown by its microstructure, is important. On the proper heat treatment depends, first, the ability to produce the steel, and second the quality of the steel. The phrase "improper heat treatment," however, has of recent years been much abused to explain "mysterious" failures. In the manu-

iron, would not give mileage results equal to the unannealed tire from the same steel, with its larger area of pearlite and greater resistance to distortion under compression. In the case of the comparatively large, natural grain of the tire as rolled, a greater area

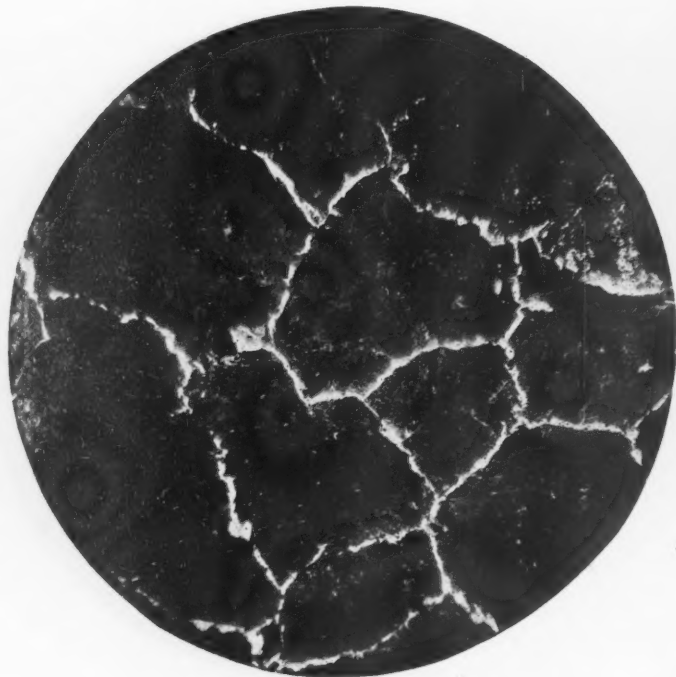


Fig. 29.

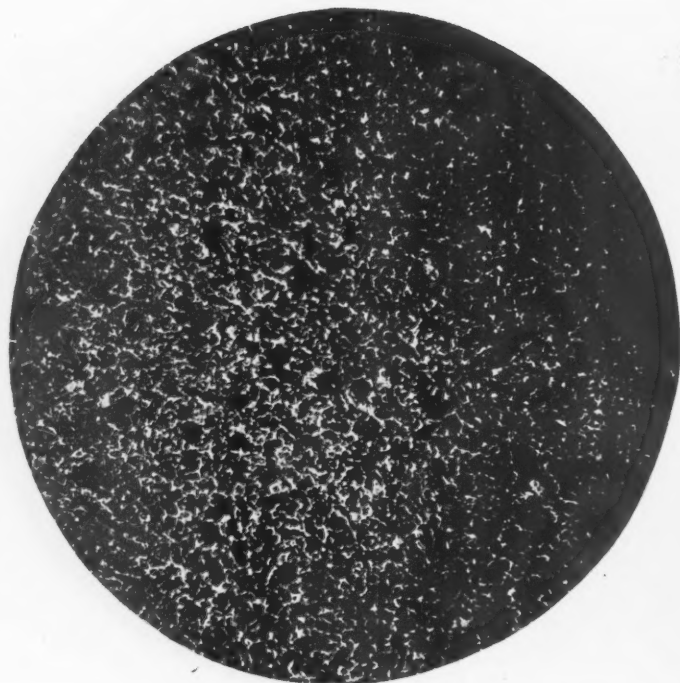


Fig. 30.

facture of tires, it is practically impossible to make a tire from an overheated or underheated ingot, as such an ingot would not withstand blooming under the hammer without failure.

The examination of the microstructure of hundreds of discarded tires which have given good service shows what would usually be considered large grain structure. The natural micrograin of steels of the carbon percentage used for tires is quite large. To obtain a fine microstructure it is necessary to anneal the tires. This treatment, however, has no effect in preventing shelliness. It is conceivable that under the heaviest wheel loads the annealed tire with the fine microstructure and large amount of isolated ferrite, or pure

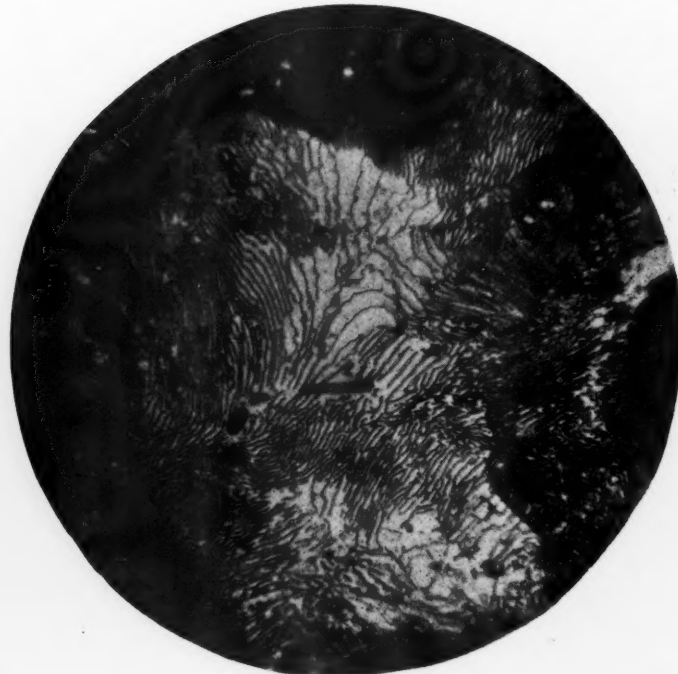


Fig. 31.



Fig. 32.



Fig. 33.

of pearlite is presented for wear than in the case of the annealed steel, as is shown in the illustrations, Figs. 29 and 30. Pearlite is the eutectic or saturated steel. It is composed of an intimate mixture of cementite (carbide of iron) and ferrite, (pure iron)

*A paper read at the October meeting of the Western Railway Club.

usually in a lamellar structure (Fig. 31). An ideal steel would be one whose structure is entirely made up of pearlite. Such a steel would contain about .85 per cent. carbon, and would be too hard for most conditions of service.

The macro, or visible structure, rather than the microstructure, plays the most important part in the life of the tire. Unlike rails, and blooms, it is not possible to roll tires direct from the initial casting heat of the ingot, consequently the ingot solidifies undisturbed by work under the hammers or in the rolling mill, and prac-

Failures from excessive shrinkage take place soon after application of the tire to the center, and always before the tire has had any appreciable service. After the tire has been in service a short time, molecular readjustment has been completed in the form of motional annealing. This increases the ductility of the steel, as shown by increased elongation and reduction of area of comparative test pieces from tires from the same ingot before and after service.

Inherent defects in the steel are usually due to piping. In some cases the pipe is present as a cavity (Figs. 32 and 33), which causes the tire to burst with a sharp transverse fracture. In other cases the pipe is present as in Fig. 10, and then a piece of the flange or tread is broken off. Tire failures from these defects are practically eliminated by the method of manufacture from long ingots.

Transverse fractures of the flanges are detailed fractures originating on the point of the flange from heat cracks produced by the action of the overlapping brake-shoe. Most of the failures of this kind have been tender and coach wheels in service over long heavy grades where the brake applications are especially severe. It has been observed that wheels which have so failed are generally

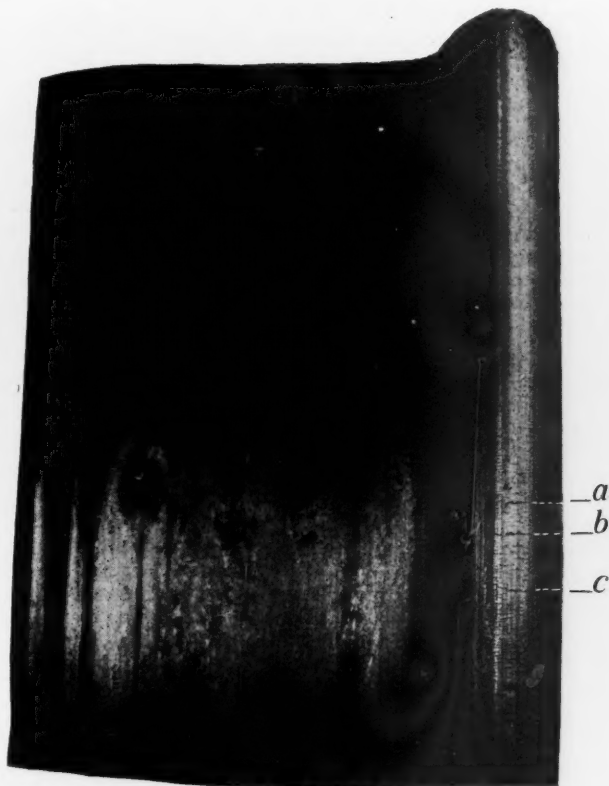


Fig. 34.

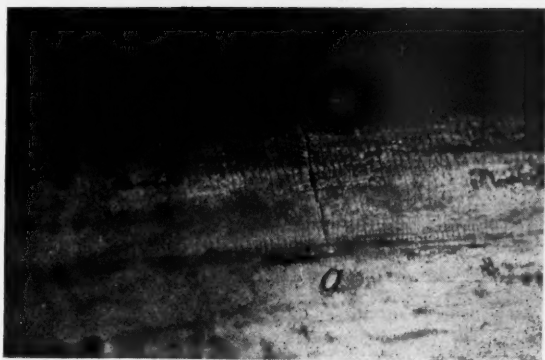


Fig. 35.

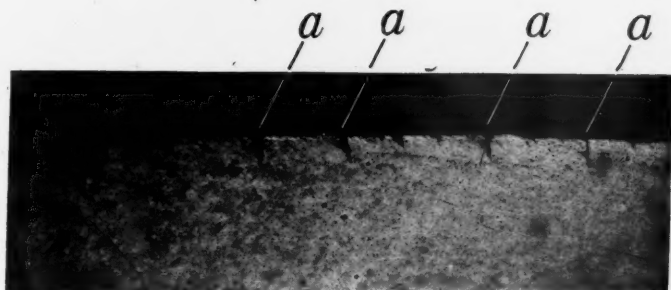


Fig. 36.

tically never shows the pronounced porosity so common in the center of the rail head. Working from a cold ingot which has solidified undisturbed, the maximum effect of the work under the hammer and in the rolls is obtained, increasing the density and homogeneity of the macro, or visible structure.

The causes producing broken tires are: excessive shrinkage, inherent defects in the steel, transverse fracture of the flange, and loose tires.

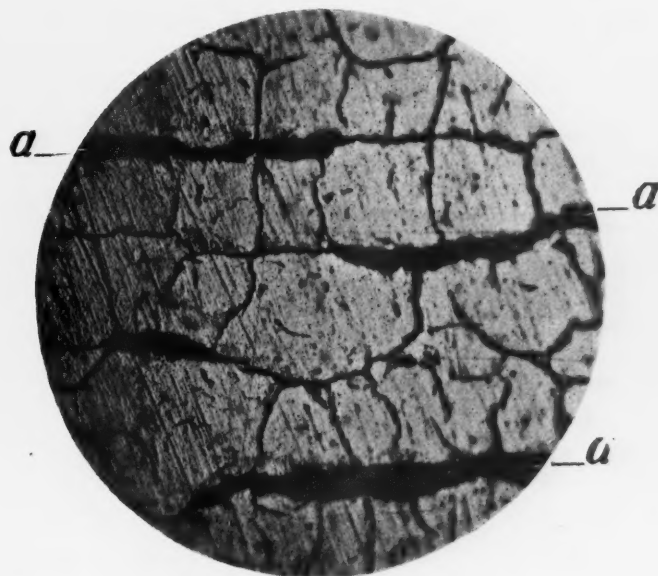


Fig. 37.

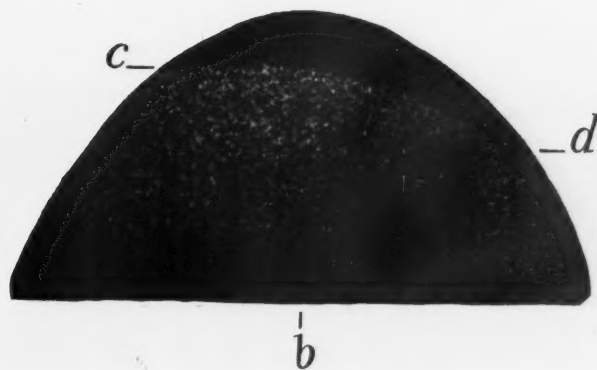


Fig. 38.

equipped with brake-shoes without inserts. Such brake-shoes generate much more heat on the flange than those with inserts, and are not so effective in scouring off the heat cracks formed by long continued brake application. In the case of the brake-shoe with inserts in the flange groove, there is quite an effectual cutting or scouring out of the heat cracks and they are therefore less liable to start a fracture.

The illustrations, Figs. 34 to 40, show plainly the origin of the flange fracture from the heat cracks, and its development into a full fracture of the tire. Fig. 34 is a view of a tire showing several small flange fractures, *a*, *b*, *c*, and their relation to the heat cracks on either side is obvious. Fig. 35 shows a portion of the flange, full size, showing more clearly than Fig. 34 the heat cracks with a fully developed fracture (*a*) in the midst of them. Fig. 36 is a longitudinal section through the flange, line *a-b* on Fig. 38, and magnified four diameters. This shows the depth to which pronounced heat cracks *a-a-a* will penetrate before developing a flange crack. Fig. 37 is a portion of the flange which has been polished and magnified 50 diameters and shows how the surface of the steel is broken up by heat cracks, like sun-dried clay. The

large cracks *a-a-a* are the transverse cracks from which the flange fractures originated, and correspond to those shown in Fig. 36. Fig. 38 is a cross-section through the flange, magnified about two diameters, and lightly etched to show the depth to which the heating effect of the shoe has hardened the steel. This is shown on the illustration by the line *c-d*. Figs. 39 and 40 show the

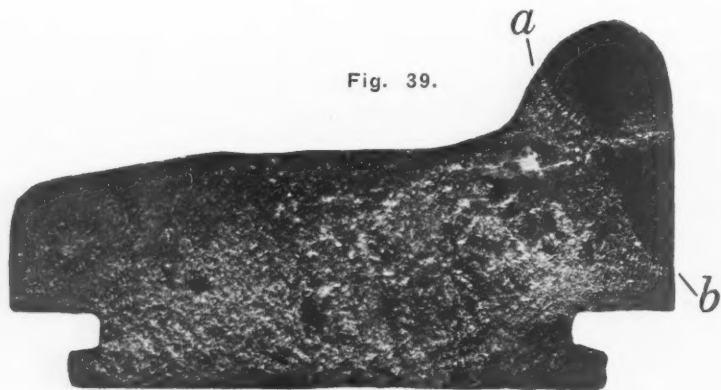


Fig. 39.

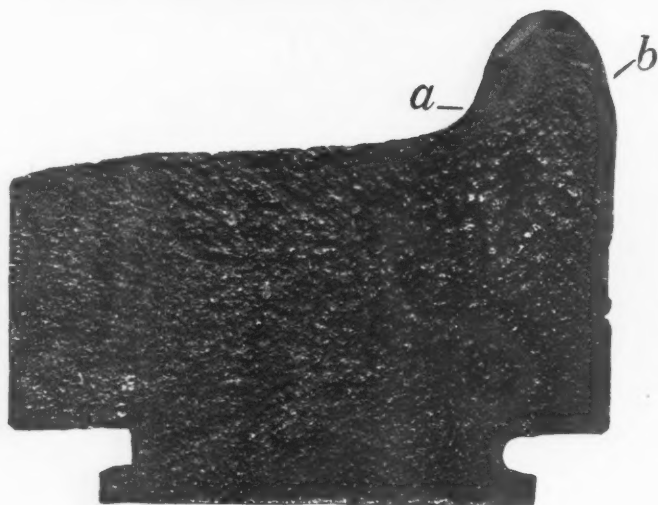


Fig. 40.

fractured surfaces of two tires and the origin of the fractures is clearly traceable to a detailed flange crack. The extent of the crack before the tires broke is plainly shown on the lines *a-b*.

Broken driving wheel tires are found to have usually closely approached or passed the limit of road wear. In addition to failures from flange fractures originating from heat cracks, there have been quite a number of failures due to the lightness of design of cast-steel driving wheel centers. On account of this lightness of design, the tire has not a sufficiently rigid backing, and when it begins to approach or reaches the usual limit of road wear the strains due to flexion of the tire are likely to cause failures.



Fig. 41.

Breakages from loose tires are confined usually to thin tires, and are due to detailed fractures, originating in the bore from repeated bending stresses. Fig. 41 shows the fracture of such a tire and how the fracture progressed by detail until only the light colored area remained when the break took place. Failures of this kind are not common as the tires are readily detected and are generally removed by the inspectors on account of being loose.

Concrete Building Construction.*

Concrete building construction can be divided into four classes: Solid heavy walls; solid light walls reinforced with rods; building blocks made with machines for that purpose, having hollow spaces at intervals throughout the wall; metal lath plastered with a Portland cement mortar.

The objections to solid walls for building purposes are: Liability to crack; expense on account of forms, and dampness seeping through the wall. The last two of these objections are found also in reinforced concrete walls.

These objections may be overcome if proper precautions are taken in the construction. The dampness of the walls may be prevented by painting the exterior surface with a waterproofing compound. There are many of these on the market to-day which answer the purpose admirably and give the surface of the building a nice and even appearance.

In making buildings of solid concrete, pilasters should be built separately as columns with anchor rods projecting from them, and the intervening wall built after the pilasters have hardened so as to make a joint at intervals in the concrete. Where reinforced concrete is used, these joints are not necessary, and, in fact, not desirable as the wall should be built as a unit. The forms are an expensive item in both kinds of construction, but their cost can be largely reduced by making a standard section which can be used many times during the construction of the building. As the appearance of the building is one of the essentials, forms should be constructed so that a tier of the building may be completed in one day and the forms from that tier moved after 24 hours and used for each succeeding tier. In this way the face of the concrete can be treated or patched successfully while green without marring the outside face.

To overcome the objections to the above, many advocate the use of the concrete building block, and there are a large number of different makes of machines on the market for molding them. These blocks have a hollow space to prevent the moisture from reaching the inside of the building. The objections to these blocks are:

It is difficult to form them without some blemish on the surface, which it is impossible to properly remedy. The molded blocks never have the sharp outlines necessary for good appearance.

The construction of blocks must be very carefully watched, otherwise, through the incompetence of the workmen or dishonesty of the maker, a very small amount of cement is used in their composition, with the result that they are very fragile and readily broken. Several cases have occurred where buildings built of blocks have fallen down of their own weight on account of the "lean" mixture used in the make-up of the blocks. Most of these blocks are very porous because they have to be made with a dry mixture. Only those blocks should be used that can be made with a wet mixture and pressed with great power. Blocks made by hand tamping with dry mixture should never be used.

The last form of construction named—plaster on expanded metal—is cheap and answers the purpose satisfactorily for all kinds of shop buildings and for cheap small buildings. This construction, however, has been used with success for elaborate buildings in California and the Southern states, and many beautiful residences are being built to-day by this method. It consists of a framework of wood or steel, with metal lath attached to the outside surface, which is coated with mortar on both sides, forming an exterior wall over 1½ in. thick. On the interior framework, metal lath may also be attached and plastered on the inside. A hollow wall is thus formed with an air space which affords perfect protection against dampness and is a good insulator for heat and cold. The outer face of the exterior wall is usually coated with a waterproofing compound. This form of construction permits of elaborate details at small expense.

Foreign Railroad Notes.

According to Russian official statistics the railroad mileage of the Russian empire at the end of 1906 was:

State railroads in Europe	20,086 miles.
State railroads in Asia	6,735 "
Private railroads	11,426 "
Branch lines	1,436 "
Railroads of the Grand Duchy of Finland	2,058 "
Total	41,741 miles.

In the Portuguese possession of West Africa 37 miles of the Lobito Railroad, from the bay of Lobito into the interior, have been completed and 15 miles have been opened for traffic. To avoid driving a tunnel, as had been originally planned, a part of the road, 6,960 ft., has been built as a rack road with 6 per cent. grade. The road has six locomotives, four passenger cars, 90 freight cars and two water cars.

*From a committee report to the Milwaukee convention of the Superintendents of Bridges and Buildings. A. O. Cunningham, T. J. Fuller, M. Riney, Committee.

GENERAL NEWS SECTION

NOTES.

The aggregate excavations on the Panama canal in the month of September amounted to 1,517,412 cu. yds., the largest month's record since the United States took control.

The Erie Railroad proposes to contest in the courts the law of New York state limiting the working hours of telegraphers, but, pending the outcome of the suit, will observe the provisions of the law.

After November 4 there will be only three five-hour trains each way between New York and Boston. The fourth, which was the last train put on, the one leaving either city at 8 a.m., has not proved profitable and is to be taken off. The train has been running 14 months. The five-hour trains run daily except Sunday.

A press despatch from the City of Mexico says that after a long investigation by a special commission, appointed by the President of Mexico, the government has decided to authorize a general increase in railroad rates, amounting to about 12 per cent. The officers of the railroad desired to make the increase 20 per cent.

The New York State Public Service Commission, First district, has issued an order requiring railroads to file their tariffs with the Commission. Until further orders these may be in any suitable form, but companies for whom a form has been prescribed by the Commission for the Second district are to follow the Second district form, so far as it is applicable.

At Toronto October 25 the Michigan Central was fined \$25,000 for neglecting to take reasonable precautions in the handling of dynamite. At Essex, Ont., an explosion occurred while a car containing the explosive was being switched (next to the engine), and evidence showed that the car had been treated like an ordinary car of freight. Two men were killed and 40 injured.

The New York, Chicago & St. Louis has now been in operation 25 years, and 75 officers and employees who have worked for the company throughout that time met in Cleveland last week and formed a Veterans' Association. Among these veterans are: B. F. Horner, General Passenger Agent; S. K. Blair, Division Superintendent; E. A. Miller, George James and R. S. Miller.

At Charleston, Ill., October 28, the Grand Jury, after spending several days investigating the collision of electric cars, which occurred near that place last August, killing 15 persons, returned indictments against both motormen, the President, the Treasurer and other officers of the company, and also against Judge Peter S. Grosscup, Judge of the United States Circuit Court in Illinois, who is a director of the railway company.

Vice-President Thornwell Fay, of the Southern Pacific Lines in Texas, has written to the President of the Agricultural College of the state, asking for the names of graduates or students who want to learn railroading. Students coming to the road will be placed first in the accounting department, and then in district superintendents' offices; then with section crews, under road masters and engineers, and so on through every department necessary to a thorough education in railroading.

The New York State Public Service Commission, First district, has ordered the Brooklyn Rapid Transit Co. to hold westbound elevated trains at the Brooklyn terminal of the Brooklyn Bridge on Saturday afternoons until they can be taken care of at the Manhattan end. The commission's inspectors have reported that it is the practice of the company, despite the larger terminal facilities at the Brooklyn end of the bridge, to send on the trains to Manhattan faster than they can be received.

The attorneys for the Standard Oil Company will ask the United States Circuit Court of Appeals to reverse the decision in which Judge Landis fined the company \$29,240,000, alleging that the government attorneys failed to inform the defense of the Alton immunity agreement; that as the Hepburn act was passed before indictments were returned, prosecution under the provisions of the Elkins law was illegal; that Judge Landis did not compute the number of violations correctly, and 22 other points.

Locomotive Fireman C. H. Rutledge, of the Philadelphia, Baltimore & Washington, lately risked his life to save that of a little child, and has been commended by General Superintendent E. F. Brooks, President McCrea and General Manager Atterbury. While firing the engine of a work train rumbling along the track near Port Deposit, Maryland, Rutledge saw a small child playing between the rails a short distance ahead. The brakes could not be applied in time to avert a catastrophe, for the approaching train had scared the little one, and instead of getting out of the way he fell on the track. He made his way along the running board, and,

with a flying start from the front of the engine, reached the child and grabbed it out of harm's way before the train passed, using less time than it takes to tell about it.

The New York State Public Service Commission, First district, has ordered an increase in service on the Broadway (surface) line of the New York City Railway, consisting of an extension southward of the runs of certain cars heretofore terminating their runs at Houston street. In the same order the Commission requires better destination signs on the cars. Another order requires an important increase in the number of cars on the Fourth and Madison avenue lines. The order gives in detail the number of cars which must be run at different portions of the day.

Consolidated Steamship Lines.

Some of the constituent companies of the Consolidated Steamship Lines have resumed management of their lines, and it is said that ultimately the Consolidated Steamship Lines will cease to be an operating company and be only a holding company. The changes in officers, so far, include the resignation of Calvin Austin as President of the Ward Line and the Mallory Lines. Mr. Austin has heretofore been President of all the companies except the New York & Porto Rico Steamship Company. He has been succeeded by H. P. Booth on the Ward Line and by H. R. Mallory on the Mallory Line. F. B. Mooney has been elected President of the New York & Porto Rico Steamship Company, succeeding J. E. Berwind. Other changes in these companies have been also made. The management of the Eastern Steamship Company and the Metropolitan Steamship Company remains as before. It is said that the Santo Domingo service of the Clyde Line will be consolidated with the New York & Porto Rico Steamship Company, and that the rest of the Clyde Line will be consolidated with the Mallory Line.

Good Safety Records Broken.

Press despatches from London, October 26, report a rear collision at West Hampstead, on the Metropolitan Underground, killing three persons. The second train had run past a signal in a fog. It is said that this is the first accident that ever occurred on the road resulting in fatal injury to passengers, and it is the first rear collision of passenger trains since this line was electrified. On the same day a collision near Dallas, Texas, on the Missouri, Kansas & Texas, caused the death of two passengers and one trainman and the serious injury of a large number of other passengers; and this is said to be the first fatal accident to a passenger, in a train accident, on that railroad. The road is over 35 years old.

That Awful Engineering Mistake.

Vice-President Samuel Rea, of the Pennsylvania Railroad Company, referring to recent sensational newspaper articles says:

"It was originally intended to change from steam to electric locomotives near the Hackensack portal of the New York tunnels, and the alinement of track from Harrison to this portal was made accordingly. It having been decided, however, to change locomotives at Harrison, this short section of track is being improved by reducing the curvature at a very moderate expenditure. The report that this revision of line is due to an engineering mistake, and involves a million dollar expenditure, is incorrect and grossly exaggerated."

Chicago Track Elevation to Date.

Steam railroads have 1,600 lineal miles of tracks in use within the city limits of Chicago, 188 square miles, and the amount of road elevated would make a single track line 700 miles long. This work has included 3,000 subways. The cost has been \$35,000,000, divided among the larger roads as follows: Pennsylvania, \$11,000,000; Rock Island & Lake Shore, \$7,000,000; Northwestern, \$6,500,000; St. Paul, \$2,500,000; Illinois Central, \$2,000,000; Burlington, \$1,100,000; Chicago Terminal, \$1,150,000. The work yet to be done is in the south and southwest sections of the city. For elevation of the tracks between Englewood and Beverly and as far as South Chicago, the Rock Island and allied roads have accepted city ordinances providing for the expenditure of \$5,000,000. The Burlington will spend in the next year or so \$1,125,000.—*Wall Street Journal*.

United States Steel Corporation.

The report of the United States Steel Corporation for the quarter ending September 30, 1907, shows net earnings of \$43,804,285, the largest in the history of the corporation with the exception of the

June 30 quarter of the present year, when the net earnings were \$45,503,705. The amount of unfilled orders on hand, 6,425,008 tons, is the smallest for the end of any quarter since that of September 30, 1905, when they were 5,865,377 tons. The present total of unfilled orders is 1,178,870 tons below the amount on the books on June 30, 1907, and 2,064,710 tons below the high record point, which was on December 31, 1906. While there has been a decrease in the orders booked for various products of the mills, the falling off in the orders for rails is presumably responsible for most of the decrease. The surplus for the September quarter, after all charges and dividends, was \$4,911,711, which compares with \$3,497,080 in the quarter ended June 30, and \$14,697,318 for the corresponding quarter in 1906. There has been, so far, reserved and set aside for the Gary plant \$49,000,000. Of this amount \$18,539,000 has already been spent.

Gold's Improved Temperature Regulator.

The Gold Car Heating & Lighting Co., 17 Battery place, New York, has recently perfected an improved form of temperature regulator for railroad car heating systems which is shown in the accompanying illustrations. It is smaller than the regulator formerly made by this company and is designed to be applied under the seat in the main supply pipe in place of the angle valve heretofore used, without disturbing any of the other equipment already installed in the car. The dial on top of the regulator is calibrated to show 5, 10, 20, 35 and 50 lbs. pressure in the radiator and by turning the handle any of these pressures desired may be obtained and automatically retained in the radiators as long as the train pipe pressure is in excess of the desired radiator pressure. Variation in train pipe pressure and in radiator condensation are taken care of equally well. When the regulator handle is in the closed position a minimum pressure of 2 lbs. is admitted to the radiator, and this is sufficient to keep the condensed water always moving to the blow-off trap. In case the supply needs to be shut off entirely a globe valve under the seat in the pipe connecting the regulator with the radiator may be closed tight.

The principle of the device is that steam at any given pressure has a corresponding temperature. At atmospheric pressure its temperature is 212 deg. Fahr. and at 2 lbs. it is 219 deg. The temperatures corresponding to the pressures obtainable with this improved regulator are 219 deg., 227 deg., 240 deg., 258 deg., 279 deg. and 297 deg. Referring to the sectional drawing, steam from the train line enters at R. As handle G is turned from left to right spring C is compressed and acting through the diaphragm U and the plate K, the valves L and M are opened, admitting steam through the outlet S to the radiator and into the chamber O under the diaphragm U. After the required pressure has been obtained in the radiator any increase will lift the diaphragm U and overcome the pressure of spring C. The valves L and M are perfectly balanced and when the pressure of spring C is overcome the lower spring N will immediately lift them to their seats and stop further admission of steam. As pressure decreases in the radiator it also relaxes under the diaphragm, allowing the spring C to again force L and M off their seats until enough steam has been admitted to compensate for the condensation due to radiation. A friction lock for the handle is provided by the spring H, which engages in grooves cut in the dome casting corresponding to the several positions of the handle to give the required pressures.

Advantages claimed for the device are that it will maintain practically an atmospheric pressure if desired for moderate temperatures or any degree of high pressure heating for extreme weather. It admits only enough steam from the train pipe to maintain the desired temperature and any excess pressure is directed to the rear of the train. A minimum pressure of 2 lbs. gives the required force to expel condensed water and air from the radiators when heating up a car. The device can be applied to any system of direct steam or hot water heating.

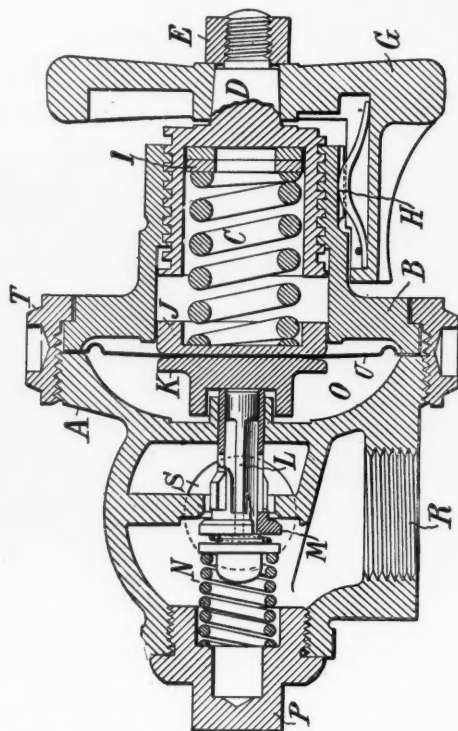
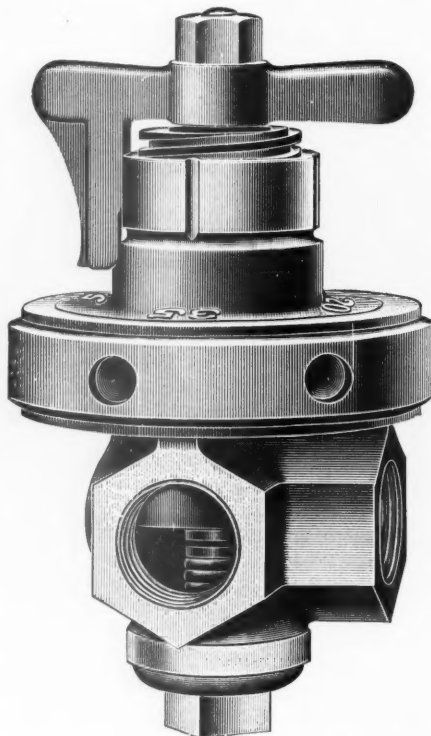
Richard Bell, M.P., Labor Leader.

Almost exactly \$26 a week is the salary of Richard Bell, General Secretary of the [British] Amalgamated Society of Railway Servants, and, by virtue of his position, a more prominent figure in the public eye for the time being than the Prime Minister or the King himself. He is two years on the right side of 50. He is

just a trifle over the average height, deep-chested, powerfully built, and straight as a pine tree. When I called to see him at the London headquarters of the society a batch of English reporters were interviewing him on the developments of the day; and I had to wait until they had done pumping him. Now, around the American headquarters of a powerful labor organization, when there is a crisis at hand, one always finds a lot of hangers-on, eager to load up the journalist with tales of grievances and fight talk. But there were no agitators of that sort here. The staff were all busy earning their pay. As the door of Mr. Bell's office opened to admit me I caught his last words to the representatives of the London papers: "Bear in mind that we want to get this thing settled without a strike if possible. Don't write anything that is going to stir up strife and ill feeling, and make it harder for a policy of conciliation to prevail."

Speaking of strikes he said: "A strike is a form of war—industrial war—and war, as your General Sherman said, is hell. It is only to be thought of when all other means of settling a dispute fail. But just as there comes a time when a nation feels compelled to submit its cause to the arbitrament of the sword, so in the struggle between capital and labor a crisis may be reached when the workers have to appeal to the only weapon they can command to which the other side is vulnerable—a strike."

"Do you consider that a strike is inevitable?"



Gold's Improved Temperature Regulator for Car Heating.

"If the railroad companies persist in refusing to recognize the union—yes. For two years the men have been pressing the executive committee to sanction this movement. Last November we formulated our programme of grievances. To them was attached a demand that deputations to the employers should be accompanied by their official representatives. Three times we have made overtures to the companies, and each time the companies have replied, in effect, with a point blank refusal to discuss the affairs of their employees 'with a third party.' In other words, they refuse to recognize our union."

"Why do you regard that as the one point of vital importance?"

"Because it is vital to the men's own interests and the principle of trade unionism. It lies at the root of collective bargaining. The railroad companies of England are really composed of some 400,000 or 500,000 shareholders. They make their bargains and conduct their negotiations with their 400,000 or 500,000 employees by means of their official representatives—experts. The employees have an equal right to be represented on their side by experts of their own choice."

"Industrial history proves conclusively that trades unions have been a powerful factor in securing improved conditions for the workers. But to be of material benefit to their members they must be 'recognized.' It is in those industries in which labor is best organized and is afforded the fullest recognition that conditions are most stable and profitable and strikes least frequent. Of that the great cotton industry and the coal mining industry are shining examples."

"Yet the directors of several of the railroad companies say that the recognition of our union means transferring the management of the roads to the men, chaos and bankruptcy. Such state-

ments are insults to public intelligence. The Northeastern—the one great railroad company which recognizes our union—has suffered no diminution of dividends or decrease of efficiency in consequence. The post-office employs more labor than any concern in England. That now recognizes the unions of its employees, with the result, as the Postmaster-General has acknowledged, that there is much less friction than formerly.”—*Springfield Republican*.



Brilliant Plan of Two Irish Gentlemen for Saving a Lady.
—Sketch.

MANUFACTURING AND BUSINESS.

The Central Inspection Bureau, New York, has an order from the Newburg & South Shore for inspecting a number of trucks to be built at the Middletown Car Works.

The Northern Electrical Manufacturing Co., Madison, Wis., has established a district office at Pittsburgh, Pa., in charge of C. A. Poe, formerly of C. A. Poe & Bro. The office is at 618 Park building. Mr. Poe has represented the company in the Pittsburgh district in conjunction with other lines for several years, but his entire attention is now devoted to this company.

The town of Lachine, Que., has, it is said, voted a bonus of \$50,000 as well as exemption from local taxes for 20 years to the Imperial Locomotive & Machine Company. This company, a subsidiary of Beyer, Peacock & Co., Manchester, England, is to build locomotive works at Lachine, as mentioned in this column last week. The cost of the plant is estimated at \$2,250,000.

The Willard Storage Battery Co., Cleveland, Ohio, is occupying its new factory, on Marquette road and Lakeside avenue. It is much larger than the old factory. There is a large three-story brick building, and a one-story frame building. The total floor space of the two is 80,000 sq. ft. Power is supplied by three Crocker-Wheeler generators, driven by two Bruce-Meriam-Abbott gas engines and a steam engine. Rolling, cutting, forming, lead-burning, assembling, etc., is done on the ground floor, and the assembling department and offices are on the second floor. The third floor has the carpentering and painting departments. The company makes storage batteries for all purposes, particularly train lighting, automobile, signal, telephone and stationary.

H. B. Ayres, Manager of the Locomotive & Machine Company

of Montreal, has resigned to become General Manager of the H. K. Porter Company, Pittsburgh, Pa. A. W. Wheatley, General Inspector of the American Locomotive Company at Schenectady, N. Y., succeeds Mr. Ayres. Forrest M. Titus, Resident Inspector at Schenectady, succeeds Mr. Wheatley. Mr. Titus began railroad work on the New York, Chicago & St. Louis as a machinist in the fall of 1903. He later went to the Union Pacific, where he worked in the same position until he was put on the staff of the Superintendent of Motive Power as shop demonstrator. He was later appointed inspector for the Harriman Lines at the Baldwin Locomotive Works. He has been with the American Locomotive Co. only since October 1 of the present year.

A statement made by the Receivers of the Westinghouse Machine Company is to the effect that the company is entirely solvent, that the receivership was simply a logical measure for conserving the interests of customers, creditors and stockholders, that there has been no pause in the operations of the company, and that the personnel remains the same as before. George Westinghouse said that both the Westinghouse Electric & Manufacturing Company and the Westinghouse Machine Company are solvent and doing the largest and most satisfactory business in their history. Each is earning liberal dividends and has quick assets about equal to its liabilities. The loans made to the Securities Investment Company and to Mr. Westinghouse are secured by stocks of the Westinghouse operating companies, and he strongly advises holders of these loans to hold their collateral until its market value is restored to its normal figure. The sacrifice of collateral at present can benefit no one. It is understood that the property of the Westinghouse Machine Company will probably be returned to the stockholders in three or four months. A plan is under way to extend for three years loans amounting to about \$8,000,000 negotiated personally by Mr. Westinghouse. Most of this money was used to help the different companies, including the foreign ones. Three trustees have been appointed in whose hands the collateral securing the loans has been placed. The par value of the collateral amounts, it is said, to \$20,000,000. The idea in appointing the trustees was to keep the collateral intact until the loans can be met without losing the collateral. T. W. Seiman, E. W. Childs and C. B. Hill have been appointed Receivers in New York for the Westinghouse Lamp Company. Mr. Seiman and D. W. Cooper have been appointed Receivers of the company's property in New Jersey. William McConway and W. D. Updegraff are the Receivers of the Nernst Lamp Company.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad conventions and engineering societies, etc., see advertising page 24.)

American Society of Mechanical Engineers.

The fifty-fourth annual meeting of this society is to be held in the Engineering Societies building at 29 West 39th street, New York, December 3-6, 1907. There will be symposiums on foundry practice. Other subjects are: The specific heat of superheated steam, with a paper by a Professor of Engineering at Cornell; the utilization of low grade fuels in gas producers; industrial education; power transmission by friction driving, and cylinder port velocities.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

Chesapeake & Ohio.—Martin Erdmann has been elected a Director, succeeding J. B. Thayer.

Chicago & Eastern Illinois.—The office of W. H. Lyford, General Counsel, has been moved from New York to Chicago.

Lehigh Valley.—L. D. Smith, Assistant Secretary, has been appointed Assistant to the President, with offices at New York and at Philadelphia, in charge of finance and accounting and such other duties as may be assigned to him. The General Auditor, the Treasurer and the Secretary will report to him.

F. L. Blendinger, Purchasing Agent and Superintendent of Telegraph, has been appointed Assistant to the Vice-President, with office at New York, in charge of the purchasing and fuel departments and such other duties as may be assigned to him.

Union Pacific.—The authority of A. L. Mohler, Vice-President and General Manager of the Lines East of Green River, has been extended to cover the lines and branches from Green River, Wyo., to the east switch of the Ogden, Utah, yards.

Operating Officers.

Atchison, Topeka & Santa Fe.—G. E. Ayer, Superintendent at Dodge City, Kan., has been appointed Superintendent at Newton, Kan.,

succeeding F. J. Easley, resigned to go to the Chicago, Rock Island & Pacific. H. A. Tice, Superintendent at Arkansas City, Kan., succeeds Mr. Ayer. W. K. Etter, Superintendent at San Marcial, N. Mex., succeeds Mr. Tice. F. L. Myers, Trainmaster at Wellington, Kan., succeeds Mr. Etter. Payson Ripley, Trainmaster at San Marcial, succeeds Mr. Myers. Daniel Orr, general traveling roadmaster of the Rio Grande division, succeeds Mr. Ripley.

Canadian Pacific.—J. K. McNeillie has been appointed Assistant Superintendent of Terminals at Toronto, Ont., succeeding F. S. Martyn, transferred.

Chicago & North-Western.—T. A. Lawson, Assistant General Superintendent, has resigned.

Colorado Southern, New Orleans & Pacific.—W. H. De France, Superintendent of the Southern division of the Kansas City Southern, has been appointed Superintendent of the Colorado Southern, New Orleans & Pacific, with office at Baton Rouge, La., with jurisdiction over the line from Baton Rouge, La., to De Quincy, which, it is expected, will be open to traffic by January 1.

Denver & Rio Grande.—R. R. Sutherland, Assistant Superintendent of the Rio Grande Western at Helper, Utah, has been appointed Superintendent of the Second and Third divisions of the Denver & Rio Grande, with office at Salida, Colo., succeeding I. H. Luke, resigned. See Kansas City Southern; also Rio Grande Junction.

Great Northern.—J. M. Gruber, General Manager of the Chicago, Burlington & Quincy Lines East of the Missouri River, has been appointed General Manager of the Great Northern, succeeding F. E. Ward, who took Mr. Gruber's place on the Burlington. Mr. Gruber will have charge of operation and maintenance.

E. L. Brown, General Superintendent of the Eastern district, has been appointed General Superintendent of the Western district, with office at Spokane, Wash., succeeding F. S. Forest, resigned. W. B. Scott, Superintendent at Everett, Wash., succeeds Mr. Brown, with office at St. Paul, Minn. J. H. O'Neill, Superintendent at Whitefish, Mont., succeeds Mr. Scott. W. B. Smith, Assistant Superintendent at that place, succeeds Mr. O'Neill.

Kansas City Southern.—I. H. Luke, Superintendent of the Second and Third divisions of the Denver & Rio Grande, has been appointed Superintendent of the Southern division of the Kansas City Southern, with office at Texarkana, Tex., succeeding W. H. De France, resigned. See Colorado Southern, New Orleans & Pacific.

Louisville & Nashville.—J. D. Patterson, formerly Superintendent of the Mobile, Jackson & Kansas City at Laurel, Miss., has been appointed Superintendent of the joint terminals at Atlanta, Ga., acting also as Superintendent of the Louisville & Nashville lines south and east of Hills Park, Ga.

New York Central & Hudson River.—J. P. Leahy and M. E. Welsh have been appointed Assistant Trainmasters at East Rochester, N. Y. W. D. Lawson has been appointed Assistant Trainmaster at Batavia, N. Y. C. H. Calkins, Trainmaster at Oswego, N. Y., has been appointed Trainmaster of the Watertown district. F. L. Whitney has been appointed Assistant Trainmaster of that district. J. A. Ashe succeeds Mr. Calkins at Oswego. W. H. Hartney has been appointed Assistant Trainmaster at Oswego. C. F. Moyer has been appointed Assistant Trainmaster at Richland, N. Y. H. J. Avery has been appointed Assistant Trainmaster of the Auburn branch, with office at Rochester, N. Y.

New York, Chicago & St. Louis.—G. C. Todd has been appointed Trainmaster of the Eastern division, with office at Conneaut, Ohio, succeeding F. T. Deahl, deceased.

Northern Pacific.—I. B. Richards, Superintendent of Transportation, has been appointed Acting General Superintendent of the Yellowstone, Montana and Rocky Mountain divisions, with office at Livingston, Mont.

Rio Grande Junction.—J. H. Brinkerhoff, Assistant Superintendent of the Fourth division of the Denver & Rio Grande, has been appointed Superintendent of the Rio Grande Junction, with office at Grande Junction, Colo.

Rio Grande Western.—See Denver & Rio Grande.

Seaboard Air Line.—J. J. Puller, division passenger agent at Philadelphia, Pa., has been appointed Assistant General Passenger Agent at Atlanta, Ga.

Traffic Officers.

Annapolis, Washington & Baltimore.—W. E. Slaughter, General Superintendent and Traffic Manager, has resigned to go to the

Washington, Baltimore & Annapolis Electric as General Passenger Agent.

St. Louis, Brownsville & Mexico.—William Doherty, who was recently appointed Traffic Manager, with office at Corpus Christi,



William Doherty.

Tex., was born in Ireland. His first railroad work was in 1887 as weighing clerk of the Texas Traffic Association. The next year he went to the Gulf, Colorado & Santa Fe as a clerk in a local freight office. He remained with this company until 1897, serving as assistant city ticket agent, then passenger agent, and finally as traveling passenger agent, with headquarters at Fort Worth, Tex. He then went to the Houston East & West Texas as traveling freight agent. In 1900 he was appointed Assistant General Passenger Agent of this company, having also the same title on the Houston & Texas Central. In 1904 he was appointed General Passenger Agent of the St. Louis, Brownsville & Mexico, which office he held until his recent promotion. Mr. Doherty is also Editor of the *Gulf Coast Magazine*.

Engineering and Rolling Stock Officers.

Beaumont, Sour Lake & Western.—See Colorado Southern, New Orleans & Pacific.

Boston & Albany.—Everett Stone, who was recently appointed Engineer of Maintenance of Way and Construction, with office at Springfield, Mass., was born in 1865 at Leicester, Mass. After graduating from Worcester Academy he began work in 1887 in a survey on the Boston & Albany. After a few months he was appointed assistant division roadmaster and in 1890 was made division roadmaster. Four years later he was appointed Assistant Chief Engineer, where he remained until his recent promotion.

Buffalo, Rochester & Pittsburgh.—E. F. Robinson, Assistant Engineer of Track, has been appointed Acting Chief Engineer, succeeding to the duties of J. M. Floesch, Chief Engineer, resigned.

Central Vermont.—William Kennedy, Master Mechanic of the Grand Trunk at Toronto, Ont., has been appointed Superintendent of Motive Power of the Central Vermont, with office at St. Albans, Vt., succeeding Archibald Buchanan, Jr., resigned to go to the New York Public Service Commission.

Chicago, Burlington & Quincy.—I. N. Wilber, Master Mechanic at Hannibal, Mo., has resigned, effective January 1, after 50 years of railroad service with the Burlington and its predecessors.

Chicago, Rock Island & Pacific.—E. J. Harris, general foreman at Valley Junction, Iowa, has been appointed Master Mechanic at that place, succeeding B. W. Cunningham, resigned to go to the Missouri Pacific.

Colorado Southern, New Orleans & Pacific.—A. L. Moler has been appointed Master Mechanic of this company and of the Beaumont, Sour Lake & Western and the Orange & Northwestern, with office at Beaumont, Tex., succeeding J. A. Baker, resigned.

Erie.—E. A. Wescott, Assistant Mechanical Superintendent, has been appointed to the new office of Superintendent of the car department, and his former office has been abolished. E. I. Dodds, Assistant to the Mechanical Superintendent, and Thomas Tracy, Assistant Master Car Builder, have been appointed to the new offices of Assistant Superintendents of the car department, and their former titles have been abolished. The headquarters of all are at Meadville, Pa.

Grand Trunk.—See Central Vermont.

New York Public Service Commission.—Henry B. Seaman, Consulting Engineer of the Bridge Department of New York City, has been appointed Chief Engineer of the Public Service Commission, First district, effective December 1. George S. Rice, heretofore Chief Engineer, has been appointed Assistant Chief Engineer in charge of construction work now under way. Mr. Seaman graduated from Swarthmore College in 1881. He worked for three years on the Erie and then went to the Kings County Elevated in Brooklyn. After working in the bridge

department of the Pennsylvania Railroad, he was for three years Principal Assistant Engineer of Wilson Bros., Philadelphia. He was then appointed Bridge Engineer of the Erie and two years later went to the New York, New Haven & Hartford in active charge of the physical improvements inaugurated by President Mellen. He was in direct charge of the four-track bridge work on the New York division and had supervision over the New Haven cut. He then went to New York as Consulting Engineer of the Bridge department of the city.

Orange & Northwestern.—See Colorado Southern, New Orleans & Pacific.

Tonopah & Goldfield.—E. F. Van Hoesen has been appointed Chief Engineer, with office at Tonopah, Nev., succeeding W. B. Chapin, who resigned last spring.

Purchasing Agents.

Lehigh Valley.—See this company under executive, financial and legal officers.

LOCOMOTIVE BUILDING.

The Denver & Rio Grande is said to have ordered 28 locomotives for January delivery.

The New York, New Haven & Hartford, it is said, is figuring on electric locomotives.

The Northern Pacific is said to have ordered 26 oil burning locomotives from the American Locomotive Co.

The Laramie, Hahn's Peak & Pacific has ordered one consolidation locomotive from the Hicks Locomotive & Car Works.

The Freeo Valley Lumber Company, Davenport, Iowa, has ordered one locomotive from the Davenport Locomotive Works.

The Toronto, Hamilton & Buffalo is said to have ordered four locomotives from the Locomotive & Machine Co. of Montreal.

The Baltimore & Ohio has not yet authorized the purchase of the locomotives for which the mechanical department has asked.

The Kansas City Southern, as reported in the *Railroad Gazette* of October 25, has ordered 21 simple consolidation (2-8-0) locomotives and nine simple switching (0-6-0) locomotives from the Baldwin Locomotive Works, for December and January delivery.

General Dimensions.		
Types of locomotives	Consolidation.	Switching.
Weight, total	324,680 lbs.	213,600 lbs.
Weight on drivers	185,000 "	128,800 "
Diameter of drivers	55 in.	51 in.
Cylinders	22 in. x 30 in.	19 in. x 26 in.
Boiler, type	Straight.	Straight; radial stayed.
" working stm. press.	200 lbs.	180 lbs.
" number of tubes	376	276
" material of tubes	Tyler charcoal iron.	
" diameter of tubes	2 in.	
" length of tubes	14 ft. 6 in.	11 ft.
Firebox, length	120 in.	108 in.
" width	40 1/4 in.	41 1/2 in.
" grate area	33.5 sq. ft.	31.4 sq. ft.
Tank capacity	6,000 gals.	4,000 gals.
Coal capacity	10 tons.	8 tons.

Special Equipment.		
Air brakes	(for consolidation)	Westinghouse
Axles	(for consolidation)	Taylor Iron; (switching) Otis
Bell ringer		Western Railway Equipment Co.
Boiler lagging		Keasbey & Mattison
Brake-beams		Simplex
Brake-shoes		"Perfecto"
Couplers		Climax
Headlights (for consolidation)		Pyle-National electric
Injector		Ohio
Piston rod packings		Sullivan metallic
Valve rod packings (for switching)		Sullivan metallic
Safety valve		Consolidation
Sanding devices		Kansas City Southern standard
Sight-feed lubricators		Nathan
Springs		Railway Steel-Spring Co.
Steam gages		Ashcroft
Tires, driving wheel		Latrobe
Tires, truck wheel (for consolidation)		Latrobe
Tires, tender wheel (for consolidation)		Latrobe
Wheel centers, drivers (for consolidation)		Cast steel; Davis counterbalancing

The Boston & Maine, as reported in the *Railroad Gazette* of October 25, has ordered 15 simple six-wheel switching (0-6-0) locomotives for January, February and June, 1908, delivery.

General Dimensions.		
Type of locomotive	6-wheel switching	
Weight, total	114,000 lbs.	
Weight on drivers	114,000 "	
Cylinders	19 in. x 24 in.	
Diameter of drivers	51 in.	
Boiler, type	Straight top; radial stay	
" working steam pressure	160 lbs.	
" number of tubes	259	
" material of tubes	National Tube Co.; Spellerized steel	
" diameter of tubes	2 in.	
" length of tubes	11 ft.	
Firebox, length	102 3/16 in.	
" width	32 3/4 in.	
" material	Worth steel	
" grate area	22.8 sq. ft.	
Heating surface, total	1,635.7 "	
Tank capacity	4,000 gals.	
Coal capacity	7 tons	

Special Equipment.		
Air-brakes		Westinghouse
Axles		Carnegie
Boiler lagging		Franklin Mfg. Co.
Brake-beams		Buffalo
Brake-shoes		Boston & Maine standard
Couplers		Tower
Headlights		Dewey
Injector		Hancock
Journal bearings		Hardy, bronze
Piston rod packings		Hayden
Valve rod packings		Hayden
Safety valve		Ashton
Sanding devices		Hanlon
Springs		Railway Steel-Spring Co.
Steam gages		American
Tires—driving wheel		Midvale
Tires—tender wheel		Chilled cast-iron

CAR BUILDING.

The Barnett Manufacturing Company, Chicago, is in the market for 15 tank cars.

The Boston & Maine is understood to have ordered 1,000 freight cars from the Laconia Car Company.

The Lehigh Valley has not yet ordered the 1,000 freight cars for which it was in the market some time ago.

The Nashville, Chattanooga & St. Louis is in the market for 100 hopper bottom gondola cars of 100,000 lbs. capacity.

J. G. White & Co., New York, are in the market for combination parlor and first class passenger coaches for the Philippine Railways.

The Norwood & St. Lawrence has ordered one first class combination baggage and passenger car from the Hicks Locomotive & Car Works.

The Buffalo, Rochester & Pittsburgh, as reported in the *Railroad Gazette* of October 25, has prepared specifications for freight cars, but no action will be taken for some weeks at least.

The Erie, as reported in the *Railroad Gazette* of October 18, is converting fifty 20-ton box cars into cabooses; half the cars are being rebuilt at the Buffalo shops and half at the Kent shops.

The City of Chicago, as reported in the *Railroad Gazette* of August 23, has made requisition for about 50 gondola cars, either new or second-hand, for which bids will be asked this fall and appropriation made next spring.

The Harriman Lines are asking bids on a number of passenger coaches, baggage cars, combination passenger and baggage cars and dining cars. Comparative bids on both steel and woden cars in each class are asked. It is denied that 26 cars have been already bought, as reported in the *Railroad Gazette* of October 25, 1907.

The South & Western, as reported in the *Railroad Gazette* of October 18, has ordered 100 self-cleaning hopper cars of 100,000 lbs. capacity from the Pressed Steel Car Company. These cars will weigh 29,583 lbs. and will measure 30 ft. 2 1/2 in. long, and 9 ft. 5 1/2 in. wide, inside measurements, and 31 ft. 11 in. long, 10 ft. wide and 10 ft. high, over all. Bodies and underframes will be of steel. The special equipment includes:

Bolsters	Simplex
Brake-beams	Simplex
Brake-shoes	Congdon
Couplers	Janney
Draft rigging	Miner
Journal boxes	Symington
Trucks	Diamond

The Philippine Railways, through J. G. White & Co., New York, has ordered 40 20-ton box cars, 40 10-ton box cars, for December, 1907, delivery, and 15 second class passenger cars for February, 1907, delivery from the American Car & Foundry Company. The 20-ton box cars will measure 31 ft. 3/4 in. long, 7 ft. 6 3/4 in. wide and 7 ft. high, inside measurements, and 32 ft. 9 5/8 in. long and 8 ft. 1 3/8 in. wide over all. The 10-ton box cars will measure 17 ft. 3/4 in. long, 7 ft. 6 3/4 in. wide and 7 ft. high, inside measurements, and 18 ft. 9 5/8 in. long and 8 ft. 1 3/8 in. wide, over all. The passenger cars will measure 41 ft. 11 1/2 in. long, 7 ft. 8 3/4 in. wide and 6 ft. 9 in. high, inside measurements, and 43 ft. long and 8 ft. 4 1/2 in. wide, over all. The bodies of all cars will be of wood and the underframes of steel. The special equipment for all cars includes:

Axles	Philippine Railway standard
Brake-beams	Buffalo
Brake-shoes	Congdon
Brakes	Westinghouse
Brasses	Brady
Couplers	Major
Draft rigging	Miner
Platforms	Passenger cars, Standard Coupler Co.
Roofs	Box cars, Murphy galvanized iron
Springs	Philippine Railway standard

The Central of New Jersey, as reported in the *Railroad Gazette* of October 18, has ordered 12 passenger coaches and eight combination passenger and baggage cars from Harlan & Hollingsworth. The coaches will seat 81 and the combination cars 58 persons. These cars will weigh 89,000 lbs. and will measure 65 ft. 3 1/2 in. long and 8 ft. 10 in. wide, inside measurements, and 74 ft. long, 10 ft. 1/2 in.

wide and 13 ft. 11 in. high, over all. Bodies and underframes will be of wood. The special equipment includes:

Bolsters	Commonwealth
Brake-beams	Simplex
Brake-shoes	Diamond S
Brakes	Westinghouse
Brasses	Magnus
Couplers	Buhoup; 3-stem
Curtain fixtures	National
Curtain material	Pantasote
Draft rigging	Miner
Dust guards	Symington
Heating system	Gold direct
Journal boxes	Symington
Light	Pintsch
Platforms	Standard Coupler Co.
Springs	Simplex
Trucks	Commonwealth, steel frames
Vestibules	Pullman
Wheels, make of	Taylor

RAILROAD STRUCTURES.

ALEXANDRIA, LA.—The St. Louis, Iron Mountain & Southern, it is said, will build a brick passenger station 200 ft. long, and a frame freight house on land between Elliott and Jackson streets, and also make other improvements to cost \$70,000.

BUFFALO, N. Y.—Contract is reported let by the Erie to Mosier & Summers for rebuilding its freight house recently destroyed by fire. The proposed structure will be of brick 32 ft. x 200 ft. and two stories high.

DEFIANCE, OHIO.—The announcement is reported made by the Baltimore & Ohio that the company will spend \$53,000 putting up a passenger station and freight house here.

EAST BUFFALO, N. Y.—The Delaware, Lackawanna & Western has made plans for a new coal trestle to be built entirely of concrete, 1,000 ft. long and with a capacity of 4,000 tons.

EUGENE, ORE.—Contracts are reported let by the Southern Pacific for a new freight house, train sheds and additional tracks. The cost of the improvements will be about \$25,000.

KINGSVILLE, TEX.—The shops of the St. Louis, Brownsville & Mexico Railroad at this place are being enlarged and other improvements of the terminal facilities are being made.

LAFAYETTE, LA.—The Southern Pacific, it is said, has bought a large plot of land here as a site for shops, a roundhouse and large switching yards.

MATAMOROS, MEX.—The Interoceanic is making many improvements, rebuilding a number of bridges, and erecting a new station here.

MINNEAPOLIS, Minn.—The Wisconsin Central has given contracts for putting up a reinforced concrete freight station 66 ft. wide at the north end and 98 ft. at the south end, 417 ft. long and four stories high. A viaduct is also to be built leading from the second floor at the south end to First avenue. These improvements will cost about \$180,000.

NUEVO LAREDO, MEX.—The National of Mexico is erecting machine shops, boiler shops, a foundry, blacksmith shops and other buildings here. It is also building roundhouses at Venegas and Nuevo Laredo.

OTTAWA, ONT.—A contract is reported let to John Quinlan & Co., of Montreal, at \$60,000 for the excavation work for the new Grand Trunk hotel and station.

PORT ARTHUR, ONT.—The Canadian Northern, it is said, is planning to put up car shops here, providing concessions are granted by the town.

POUGHKEEPSIE, N. Y.—Announcement is made that repairs on the bridge over the Hudson river, which have cost the New York, New Haven & Hartford about \$1,500,000, will be finished about December 1.

READING, PA.—The Board of Public Works has given to Hawman Bros. a contract for the Spring street subway at \$110,480. The next lowest bidder was David B. Peoples, who offered to do the work for \$110,945. The contract will have to be ratified by the Council and approved by the Mayor.

SABINAS, MEX.—The Mexican International is constructing steel bridges across the Sabinas and Tepehuanes rivers. The Sabinas bridge will be 826 ft. long and will consist of 10 steel girders. The Tepehuanes structure will have six steel girders. The large shops of this road at Durango were recently finished. The roundhouse at Monclova has just been rebuilt, and the additions to the shops of the road at that place will soon be finished.

SHARON SPRINGS, Kan.—The Union Pacific has work under way putting up roundhouses, making a new yard and putting in tracks. It has been decided to make this place a division point in place of Cheyenne Wells, Colo.

VANCOUVER, B. C.—Arrangements have almost been finished for building the second Narrows bridge, and it is expected that bids will shortly be asked for.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

BANGOR & AROOSTOOK.—The report of this company for the year ended June 30, 1907, shows that work on the Medford extension from South La Grange north through Medford to a junction with the main line about four miles north of Sebouis is about ready for operation. The line has low grades and is shorter than the line via Milo Junction, Brownville and Schoodic. No mention beyond indicating it on the map is made in the report of the line projected north from the main line at Sebouis along the east bank of the Allagash river to St. Francis, 140 miles.

BEAUMONT & GREAT NORTHERN.—This company expects to let contracts this year for an extension from Livingston, Tex., south-east to Beaumont, 70 miles. Surveys made. (Oct. 18, p. 472.)

BIG FORK & INTERNATIONAL FALLS.—See Northern Pacific.

BUFFALO & SUSQUEHANNA.—Estimates of the cost of rebuilding portions of this road south from Juneau junction southwest to Sagamore, 23 miles, are being prepared. When the road was built from Juneau junction to Sagamore, light rails were used, and many curves and grades prevent the hauling of heavy traffic. The company owns sufficient right of way to rebuild the line and the work is to be rushed. No action has been taken on the proposed extension south from Sagamore toward Pittsburgh.

CANANEA, YAQUI RIVER & PACIFIC.—See Southern Pacific.

CANADIAN PACIFIC.—An officer writes concerning the proposed line from Killam, Alb., northwest to Strathcona, about 80 miles, that although this company has made a reconnaissance, no authority to build the line has yet been asked for. (Oct. 18, p. 472.)

Surveys, it is reported, have been made by this company for a branch from Michel, B. C., to the company's coal mines in the upper Elk valley. Grading is to be started at once.

CHARLESTON & PARIS INTERURBAN.—Grading is reported under way by this company on its proposed electric line from Charleston, Ill., northeast via Ashmore, Kansas, Dudley and Conlogue to Paris, 28 miles. W. R. Patton, of Charleston, is President.

CHICAGO & NORTH-WESTERN.—The new steel bridge over the Missouri river between Pierre and Fort Pierre, S. Dak., connecting this company's line with its new line, the Pierre, Rapid City & North-Western, from Pierre, S. Dak., west to Rapid City, has been opened for traffic. Plans are being made by the company to run trains between Chicago and Rapid City via Pierre.

CHICAGO, BURLINGTON & QUINCY.—During the year ended June 30, 1907, this company finished work on its line from Frannie, Wyo., south to Worland, 91 miles, and the line is now open for traffic. The extension from Worland south to Kirby, 20.45 miles, is expected to be finished this year. The line from Centralia, Ill., south to Herrin, 53 miles, was also finished and placed in operation. A new line is being built to reduce the grades from Lincoln, Neb., including a new yard at that place, west to Milford. A line is projected from Newark, Neb., west to Bridgeport, about 240 miles.

CHICAGO, INDIANAPOLIS & EVANSVILLE.—The initial construction work on this line projected from Evansville, Ind., north to Indianapolis and Indiana Harbor, 346 miles, with a branch from Logansport, Ind., north to South Bend, 70 miles, will be the building of a bridge across White river, 10 miles below Petersburg, Ind. The first rails on the road will be laid in Vanderburg county in a few days, the contracts for the rails having been let in Chicago. It is believed the line from Evansville north to White River, 45 miles, will be finished by the time the bridge is in place. (July 5, p. 27.)

CHICAGO, WEATHERFORD & BRAZOS VALLEY.—This company, organized to build a line from Weatherford, Texas, to Bridgeport, 38 miles, it is said, has made arrangements for financing the project, and construction is to begin within 90 days. G. R. Turner, of New Orleans, is interested. (March 15, p. 381.)

COFFEYVILLE & MEMPHIS.—This company, which was incorporated about a year ago with a capital of \$1,000,000, has surveys made for its proposed line from Coffeyville, Kan., southeast through Centralia, Vinita and Afton, Okla., to Little Rock, Ark., about 300 miles. Work on the line is to be begun this year. (March 15, p. 382.)

DECATUR, SULLIVAN & MATTOON (ELECTRIC).—Work, it is said, is soon to be begun on an electric line from Mattoon, Ill., northwest to Sullivan, 15 miles. R. D. Starbuck, President, Mattoon.

GOTEBO & SOUTHWESTERN.—This company, chartered to build a line from Gotebo, Kiowa county, Oklahoma, south to Frederick, Tillman county, 45 miles, has filed an amendment providing for the construction of 125 miles of railroad from Clinton, Custer county, south via Gotebo to Frederick, and increasing the capital stock to \$1,000,000. (May 17, p. 695.)

GRAND TRUNK.—The annual report of this company says that the line between St. Lambert, Que., at the east end of the Victoria bridge and St. Rosalie, 31 miles, used jointly by this company and the Intercolonial, is being double tracked. The work is expected to be finished this year. The double-track work between Lynden, Ont., and Brantford, and London and Hyde Park Junction gives a continuous double-track from Montreal to Chicago, 850 miles, with the exception of the St. Clair tunnel, which is single-track, and about five miles at Valparaiso, Ind., where work has been delayed owing to arrangements yet to be made to cross the tracks of other companies.

HOUSTON & BRAZOS VALLEY.—Vice-President Felix Jackson is quoted as saying that the present plans only include building the extension from Anchor, Tex., north to a connection with the Gulf, Colorado & Santa Fe, at Duke, 25 miles. It has not yet been decided whether a line will be built from Duke north to Houston, or traffic arrangements made over some existing road. About four miles of the extension from Anchor has been built. (July 5, p. 27.)

IOWA & NORTHWESTERN.—This company, incorporated about a year ago to build a line from Waterloo, Iowa, east for about 75 miles, it is said, has secured money from the Carnegie Trust Company and the work will soon be begun. (March 15, p. 385.)

KANSAS & TEXAS.—Incorporated in Oklahoma to build a line from Garden City, Kan., on the Atchison, Topeka & Santa Fe, south via Guymon, Okla., to Amarillo, Tex., and thence southeast to Houston, 800 miles. The estimated cost of the proposed line is \$5,000,000. The incorporators include J. H. Barnard, of Boston, Mass.; J. L. Gilson, W. C. Crow, G. W. Gilson, C. M. Funk and E. Gilson, of Guymon.

KENTUCKY ROADS (ELECTRIC).—Residents of Carlisle, Sharpsburg and Salt Lick recently held a meeting at Owingsville, Ky., to raise a bonus of \$80,000 to build an electric line from Salt Lick northwest via Owingsville and Sharpsburg to Carlisle, 36 miles. The Kaufman-Shaw Construction Company, of Dayton, Ohio, is expected to build the line.

LAWTON, WICHITA FALLS & NORTHWESTERN.—J. M. Bellamy, of Lawton, President of this company, is asking for bids, and it is said that contracts will shortly be let for grading this proposed line, projected from Lawton, Okla., south to Wichita Falls, Tex., 49 miles. A. J. Robinson, Chief Engineer, Frederick, Okla. (May 24, p. 727.)

LOUISVILLE & NASHVILLE.—The report of this company for the year ended June 30, 1907, shows that the reduction of grades from Corbin, Ky., south to Saxton, has been finished. Work has been started reducing the grades and putting in double-track from Corbin north to Livingston. When this work is finished, the company will have double-track between Sinks and Corbin, 35 miles.

The Morganfield & Atlanta from Providence, Ky., to Morganfield, 25.33 miles, has been finished and placed in operation.

MEXICAN CENTRAL.—The report of this company for the year ended June 30, 1907, shows that work is progressing rapidly on the extension of the Guadalajara division from Tuxpan to Manzanillo on the Pacific coast. It is expected to have the line finished by July of next year. During the year the branch from Ocotlan to Atotonilco, 22.22 miles, was finished and opened for traffic. The extension from Marfil northeast, five miles, giving an entrance into the city of Guanajuato, will be finished this year. Contracts have been let and work is under way on the first 31 miles of the short line from Tampico to the City of Mexico.

MEXICAN ROADS.—Construction work, it is said, has not been suspended on the Mineral Belt line in the Guanajuato district. Interests closely identified with the Guanajuato Development Company are building the line, which is to be about 40 miles long. The construction work is in charge of E. J. White.

MIDLAND VALLEY.—Plans, it is said, are being made to extend this road from Arkansas City, Kan., northwest to Wichita, 55 miles.

MISSOURI, OKLAHOMA & GULF.—Announcement has been made by President William Kenefick that \$6,000,000 will be spent for extensions. This includes work on the main line from Dustin, Okla., the present southern terminus, south to Denison, Texas, 128 miles, and probably a branch from Wapanucka on this extension northwest, via Connersville and Pontotoc to Sulphur. (June 14, p. 878.)

MISSOURI PACIFIC.—Passenger service over the St. Louis, Iron Mountain & Southern, it is said, is to be extended. This is to be accomplished by connecting the St. L., I. M. & S. with the Coal Belt Electric road at No. 7 mines near Herrin, Ill., and from that point

trains are to be run to Marion over the electric road, which is owned and controlled by the Gould interests. The electric service is not to be abandoned. By this extension the Missouri Pacific system will be in shape to compete with the Illinois Central for the passenger traffic to and from St. Louis of a great section in Southern Illinois.

MORGANFIELD & ATLANTA.—See Louisville & Nashville.

NEWPORT & NORMAN.—Incorporated in South Dakota with \$8,000,000 capital and office at Pierre. The company proposes to build a line from Douglas county, S. Dak., southwest to a point in Rock county, Neb., 75 miles. The incorporators include E. Banning, T. C. McPhillon, P. M. Banning and O. W. Boyd, of Chicago; C. A. Miller, of Minneapolis, Minn.; I. W. Goodner and M. P. Goodner, of Pierre, S. Dak.

NORTHERN PACIFIC.—The report of this company for the year ended June 30, 1907, shows that the Big Fork & International Falls, building from the terminus of the Big Fork & Northern, at Big Falls, Minn., northeast to International Falls on the Rainy Lake river, 34 miles, is to be finished and put in operation this year. Work on the Oregon, Washington & Idaho, which is being built jointly by this company and the Union Pacific from Texas Ferry, Wash., on the Snake river east to Grangeville, Idaho, is under way. The part of the line between Texas Ferry and Lewiston, Idaho, 72.3 miles, is being built under the direction of the Union Pacific and is almost finished. The work includes a bridge over the Snake river at Lewiston, which is to be finished this year. The extension from Culdesac, Idaho, southeast to Grangeville, 55 miles, has 80 per cent. of the work finished and is expected to be put in operation this year.

The Portland & Seattle, which is being built jointly by this company and the Great Northern from Portland, Ore., east to Spokane, Wash., with a branch to Texas Ferry, where connection is to be made with the line owned jointly by the Northern Pacific and the Union Pacific, is nearing completion between Kennewick and Vancouver, 220.6 miles. Work is under way on the large bridges over the Columbia and Willamette rivers, and is expected to be finished by June, 1908. The line between Pasco and Spokane, 145.1 miles, and the branch to Texas Ferry, 40.6 miles, is expected to be finished next summer. The total mileage from the connection with the Northern Pacific in Spokane to the connection with the same road near Portland and the branch to Texas Ferry will be 415.1 miles. A new line is being built from Alta, N. Dak., to Berea, 9.4 miles north of Valley City, to give an alternate line for heavy freight and fast passenger trains. A new track on revised grade is being built for westbound trains from Wheatland, N. Dak., to Buffalo, 11.2 miles; the present line will be used for eastbound trains. The surplus material taken from cut is being used as filling for double-track work between Casselton and Wheatland, which is to be finished next year. Work is under way, which it is expected will be finished this year from Livingston, Mont., west to Muir, 11.5 miles, to provide a double-track between Livingston and the east end of the tunnel on the Bozeman mountain. The distance will be reduced 1,142 ft. and the curvature 642 deg. Second main track is now under construction from the west end of the tunnel to Bozeman, 11.8 miles. This work is expected to be finished and put in operation next year. Work is under way changing the line and grades in connection with the second track between Garrison, Mont., and Missoula, 69.1 miles. When finished the new line will be 5.2 miles shorter than the existing line. There will also be an alternate line to eliminate mountain grades from St. Regis, Mont., to Paradise, 21.8 miles; this in connection with the proposed line and grade revision between De Smeth and St. Regis, now operated as a branch line, will reduce the eastbound grade to 0.3 per cent. and westbound grade to level between Tunah and Paradise. It is expected to have this work finished next year.

On the White Pine Hill line, 28.4 miles, work is under way on a change of line to reduce grades; the distance will be increased 1.3 miles. In Washington between Kalama and Vancouver second main track work and improving line and grades on 29.9 miles is under way, and is expected to be finished in the fall of 1908. This work will reduce the distance 358 ft. curvature, 329 deg., and rise and fall 98 ft.

OREGON, WASHINGTON & IDAHO.—See Northern Pacific.

PECOS, SARAGOSA & BALMORHEA.—This company is being organized to build a line from Pecos, Texas, southwest, 40 miles, down the valley of Toyah creek. The headquarters of the company is at Pecos.

PENNSYLVANIA LINES WEST.—This company has under consideration the question of shortly making improvements on the Waynesburg & Washington. This line, which is 28.15 miles long, is narrow gage, and is to be made standard. It is said that a line is now building from a point near Ellsworth, Pa., south to Zollarsville, under the name of the Pennsylvania Southern, to relieve the freight congestion in that section. The line is eventually to be extended

from Zollarsville west via Bissel to Hackneys on the Waynesburg & Washington.

PENNSYLVANIA SOUTHERN.—See Pennsylvania Lines West.

PORTLAND & SEATTLE.—See Northern Pacific.

ST. LOUIS, BARTLESVILLE & PACIFIC.—This company, it is said, is building its proposed line from Bartlesville, Okla., west to Pond Creek, Okla., and has filed an amendment to its charter authorizing it to extend its line from Pond Creek west to a connection with the Kansas City, Mexico & Orient, about 40 miles. (Oct. 11, p. 435.)

ST. LOUIS, BROWNSVILLE & MEXICO.—It is announced that this company will begin to operate its passenger trains into Galveston and Houston this year. Trackage rights over the Gulf, Colorado & Santa Fe have been obtained from Algoa into Houston and south into Galveston. This arrangement will go into effect as soon as the Santa Fe completes the work of enlarging its terminal facilities at these places to accommodate the additional traffic.

ST. LOUIS, IRON MOUNTAIN & SOUTHERN.—See Missouri Pacific.

SOUTHERN PACIFIC.—According to Vice-Consul A. W. Brickwood, of Nogales, the Cananea, Yaqui River & Pacific has let the contract for its line in the state of Sonora, from a point on its Naco-Cananea line northwest to Nogales, 100 miles. The entire line must be built within 18 months. Surveys are made and grading has already been done from the east end of the new line from Verde for 10 miles, and rails are being laid on this portion. A large force is also to be started grading from the west end at Nogales. The line will connect important mineral regions. (Oct. 4, p. 403.)

It is stated by J. H. Cashion, General Manager of the Grant Brothers Construction Company, of Los Angeles, Cal., which has the contract for the construction of the greater part of the Cananea, Yaqui River & Pacific, in Mexico, that more than 6,000 men and 2,000 teams are now at work. The laborers are divided into four large camps. The largest gang is working on the main line from Guaymas, southeast to Mazatlan, 600 miles. About 300 miles of this division is finished. Another gang is working from Mazatlan southeast to Tepic, 200 miles; another on the branch from Corral north to Nacozari, and another between Nogales and Del Rio. The main line is to run from Guaymas southeast to Orendain, 25 miles from Guadalajara, where connection is to be made with the Mexican Central. A branch line is also being built from Del Rio on the north, south to Nogales. The Mexican Engineering and Construction Company, of Mexico City, has the contract to build the first division out of Orendain toward Tepic. Many Yaqui Indians are employed in the work.

TEXAS CENTRAL.—This road, it is said, is to be extended from its present western terminus, in Fisher county, Texas, northwest, traversing the upper part of the Brazos river valley for some distance to Emma, about 90 miles. The construction work is to be started as soon as the survey is finished.

UNION PACIFIC.—See Northern Pacific.

VANCOUVER ISLAND & EASTERN.—Application is being made to the Dominion Parliament to incorporate this company. The company proposes to build a line from a point near Victoria, B. C., northeast via Yellow Head Pass to Edmonton, Alb., 500 miles. Connection would be made with Vancouver Island either by ferry or a bridge across the strait. R. Chowe, Victoria, is the attorney.

VERA CRUZ TERMINAL.—It is authoritatively announced that this company, now organizing in London, with a capital of \$6,000,000, will let contracts for the construction of the new terminals at Vera Cruz within seventy days. The company is to be composed of representatives of the Mexican (Vera Cruz), the InterOceanic, the Vera Cruz & Pacific and the Alvarado railroads, all of which enter the port of Vera Cruz. The proposed improvements, according to the plans and estimates, will cost \$6,000,000. The work includes customs warehouses and a union station.

WASHINGTON, FREDERICK & GETTYSBURG (ELECTRIC).—Rights of way have been secured for about 12 miles by this company for its proposed electric line through Montgomery county, Maryland. The company is now building 16 miles in Frederick county, on a line which is eventually to be extended to Emmittsburg and to Gettysburg. D. C. Kemp, President, Frederick.

WAYNESBURG & WASHINGTON.—See Pennsylvania Lines West.

WISCONSIN CENTRAL.—Contract is reported let by this company to the Lantry Construction Company of Kansas City, for piercing a tunnel 2,000 ft. long at Duluth, Minn.

RAILROAD CORPORATION NEWS.

CENTRAL OF GEORGIA.—See Norfolk & Southern.

CENTRAL VERMONT.—Gross earnings for the year ended June 30, 1907, were \$3,833,088, a decrease of \$3,888; net earnings, after taxes,

\$688,381, an increase of \$1,753. The net income was \$1,813, a decrease of \$2,703.

CHESAPEAKE & OHIO.—The President is quoted as having said, at the annual meeting on October 22, that, judging from the earnings for the last few months, the net earnings for the present year would be the largest in the history of the company, and that the stockholders might expect an increased dividend.

KANAWHA & MICHIGAN.—Gross earnings for the year ended June 30, 1907, were \$2,377,662, an increase of \$224,899; net earnings, \$515,695, a decrease of \$20,434. The net income was \$267,076, and \$384,869 was spent for additions and betterments and for retiring equipment trust obligations, leaving a deficit to be carried to profit and loss account of \$117,793.

LOUISIANA & ARKANSAS.—Gross earnings for the year ended June 30, 1907, were \$1,216,837, an increase of \$159,312; net earnings, after taxes, \$368,078, a decrease of \$3,266. The surplus after charges was \$225,484, a decrease of \$13,175.

MILLBROOK COMPANY.—See New York, New Haven & Hartford.

NEW YORK & PORTCHESTER (ELECTRIC).—See New York, New Haven & Hartford.

NEW YORK, NEW HAVEN & HARTFORD.—The Millbrook Company, which owns all the stock of the New York & Portchester and a majority of the stock of the New York, Westchester & Boston, has been sold by Oakleigh Thorne and Marsden J. Perry to the New York, New Haven & Hartford. The routes of the projected electric lines of the Westchester and Portchester companies were parallel and close together. They were to run from the northern part of New York City to White Plains, N. Y., and to points on the north shore of Long Island Sound. The companies opposed each other for some time until last November, when Messrs. Thorne and Perry bought control of both. It is said that the two companies have spent between \$4,000,000 and \$5,000,000, most of the actual construction work having been done by the New York, Westchester & Boston, which has graded most of its four-track line from 177th street, New York, to Mount Vernon, and has erected many steel bridges. The New Haven, it is now learned, has been financing this work for the past year. The Harlem branch of the New York, New Haven & Hartford runs close to the 177th street terminus. (See New York, Westchester & Boston; November 23, 1906, p. 146.)

NEW YORK, WESTCHESTER & BOSTON (ELECTRIC).—See New York, New Haven & Hartford.

NORFOLK & SOUTHERN.—It is said that this company is ultimately to acquire the stock of the Central of Georgia, all of which was bought last June by Oakley Thorne and Marsden J. Perry. Mr. Thorne was quoted last week as saying that he had already sold his share. Mr. Perry is Chairman of the Board of the Norfolk & Southern.

PENNSYLVANIA.—About \$37,000,000 of the \$50,000,000 4½ per cent. notes maturing on November 1 were redeemed in advance by Kuhn, Loeb & Co., New York, up to October 30. The remaining \$13,000,000 are to be redeemed by the railroad company to-day.

PERE MARQUETTE.—The special meeting of stockholders called for October 28 to approve the reorganization plan has been postponed for two weeks.

TOLEDO & OHIO CENTRAL.—Gross earnings for the year ended June 30, 1907, were \$4,866,661, an increase of \$794,499; net earnings, after taxes, \$1,547,031, an increase of \$542,757. Net income was \$1,185,295, and out of this \$826,765 was appropriated for additions and betterments, new equipment, payment of equipment notes and for retiring a special equipment and betterment loan, leaving \$358,530 surplus for profit and loss.

UNION PACIFIC.—At a meeting of the Directors, held on October 30, a committee was appointed to consider plans for forming a holding company to take over the Union Pacific's interests in other companies. The committee consists of E. H. Harriman, Henry C. Frick, Marvin Hughitt, R. S. Lovett, James Stillman, Oliver Ames, P. A. Valentine and Robert W. Goellet. The par value of the securities of other companies held by the Union Pacific amounts to about \$300,000,000, yielding about \$15,000,000 annual income; none of these securities are pledged as collateral for loans, except \$108,000,000 of the Southern Pacific stock, which is part security for an authorized issue of \$100,000,000 refunding mortgage Oregon Short Line bonds, of which \$45,000,000 have been issued.

WICHITA FALLS & NORTHWESTERN.—A mortgage has been filed with the Commonwealth Trust Company, of St. Louis, securing an issue of, it is said, \$640,000 bonds.